ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

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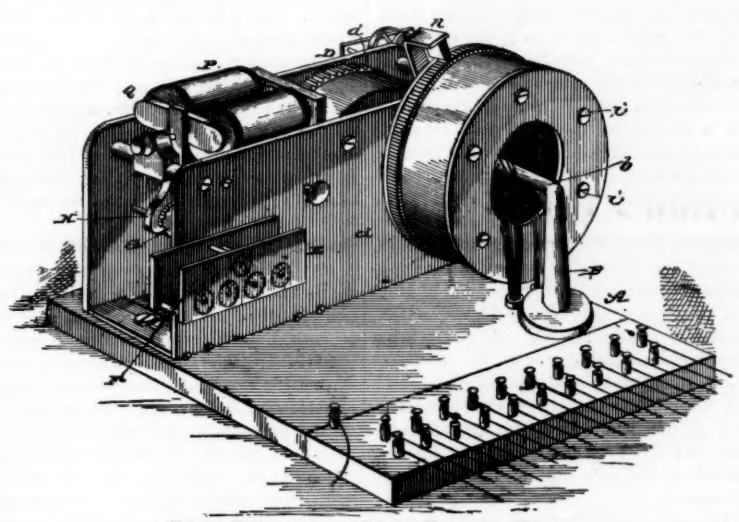
The New Grove Electric Meter.

A new electric meter, invented by Mr. J. Ross Grove, of Philadelphia, is now to be seen in constant use in that city. The principle of the invention is a meter operated by clockwork and arranged to register proportionately more frequently for lights of brilliant candle power than for those of lesser brilliancy. Obviously the more simple and less novel the method of computing the consumption of light, the more thoroughly it will be appreciated by the public. It has, heretofore, been customary to speak of electricity in terms highly scientific, and therefore seldom understood by the consumer. It is one of the objects of this machine to render it possible to express the consumption of electricity in units equivalent in light to cubic feet of gas. The dial used with this meter is the same as that of an ordinary gas meter. The meter consists of a clock movement operating the mechanical parts in connection with the registering apparatus operated by an electric current supplied by a battery. In the meter are a number of metallic rings each of which, if all the lamps connected with the meter are of unit candle power, is connected with one lamp; in case any lamp is of more than unit (arbitrary) candle power it is connected with as many rings as there are units of its candle power. Each ring carries an equal number of arms, each arm terminating in a surface exposed on the periphery of the dial, forming a contact point. Two or more brushes pass over their contact points at regular intervals of time. Whenever a light is turned on, the ring or rings with which it is connected, and the corresponding contact points, are electrified.

As soon as a brush forms a contact with one of the points, a current is sent through the magnet of the registering apparatus and the dial is made to register one. The meter is operated by an independent battery current, and does not interfere with, or depend upon the current of the light. The connection between the meter and the lamp is formed when the key is turned to light the lamp, by means of the battery current, over a wire extending from the lamp to the meter. It is proposed to use sockets of different sizes, for holding the lamps of different brilliancies, in order to prevent the use of high candle power lamps, when connections have been made with the meter, for lamps of lower candle power. The inventor, in addition, has a method of connecting the meter without any wires extending from the lamps, which is specially advantageous in places where the light wiring has already been done. This new meter is owned by the Grove Electric Company, 1406 Chestnut St., Philadelphia, who are arranging to manufacture on an extensive scale.

Earth Currents and Terrestrial Heat.

This being the case—that is, its presence everywhere—why do we not see any manifestation of it in such forms as thunder and lightning in arid districts? Why are places like parts of California, Arizona, and other arid countries exempt from thunder and lightning? There can be but one answer to these questions. While there is plenty of electricity, there is no water in the atmosphere in those localities for the force to work on to produce such results. Lightning is the very simple effect of the decomposition of the water in the atmosphere by means of the electric currents which generate volumes of oxygen and hydrogen gases, that, blending with the nitrogen and carbon gases in the air in explosive proportions, produce combustible compounds, which, when they explode, bring about the effect we call lightning. From what little we know of electricity there is no difficulty in supposing the generation of these gases to be just as instantaneous as their ignition and explosion. The effect can only be measured by the amounts of material used in the work of production. Just so simple is nature's work. Oftentimes the effects are so wonderful and magnificent that they appall us and almost stupefy our reason, leading us to look for some tedious and occult cause rather than accept the simpler and obvious reason that nearly always lies close at hand.



Front View of the Grove Electric Meter.

His Gas Bill.

"See here, General," said Mr. John E. Bell, as he approached the President of the Cincinnati Gas Company, on 'Change, one day last week. "See here, I don't often kick about my gas bill, but I do think this is outrageous. You have sent me a $13 bill for gas in my office and I've been away to California and Long Island most all summer. Now, there must be some mistake. Certainly the pipes at my office are leaking. I wish you would send a man up to look them over."

"All right," said Gen. Hickenlooper, "I will take pleasure in having the matter looked up;" saying which, he took the folded bill for a memorandum, and, without looking at it, put it in his pocket. The next day the two gentlemen again came together on 'Change, and Gen. Hickenlooper opened the conversation with:

"John Bell, were you trying to make game of me or the Gas Company? Here is your bill;" saying which, he produced the identical piece of paper Mr. Bell handed him the day before, and continued: "Any rich man who will kick against a gas bill for thirteen cents, I've got my opinion of."

Mr. Bell looked at the bill, and, sure enough, it was marked just .13, and then a laugh went up from the crowd of gentlemen who stood around, and then Mr. Bell came back with: "And I, too, have got my opinion of any gas company that will present a bill for $13, and then when there is a kick, move the decimal point two places to the left."

Rochester Telephone Business.

Manager Mallett of the local telephone office, Rochester, N. Y., was sworn by the State Assembly Committee. He said: There are 132 or 133 instruments now in use in this city. In November, 1886, there were 966 'phones in use, and 25 operators were employed. The night operator—a man—received $35. Three operators received $29, nine, $26, two, $24, two, $20, one $18, and six, $15. There were seven linemen at that time who received $2 a day, two received $1.75 a day, and the foreman received $70 a month. There were two inspectors, of whom one received $50 a month and the other $2 a day. The canvasser received $70 and the collector $35 a month. I receive a salary of $1,800 a year. From November 1, 1885, to November 1, 1886, the receipts of the office were: Telephone collection, $49,214.22; toll for use of trunk lines, $3,841.32; private lines, $1,095; total, $54,150.44. There were no other receipts during the year except $300 for sundries. The disbursements were charged as exchange expenses and amount to $23,436.08. Chairman Ainsworth said that at a future sitting of the committee he would ask Mr. Mallett to have a statement prepared, showing how much of the $23,436.08 was for maintenance, how much for construction and how much for office work. Manager Mallett said that there are now two linemen, five operators and a canvasser besides himself in the office. The session was then adjourned to meet in Buffalo. The committee will return and resume its investigation in Rochester in November.

⁂ The Emmner Union Telephone Company has been organized under the laws of the state of Missouri. Washington, D. C. is its headquarters.

"What is an Electrician?"

Dr. Leonard Waldo, of Yale College, speaks on this Question before the Electric Club—Views of Members and Visitors.

The regular monthly meeting of the Electric Club, held Thursday evening, October 20, was the occasion of an interesting and instructive handling of the question of "What is an Electrician?" Before the dinner which precedes the reading of papers at these meetings, the Board of Managers and House Committee took action upon several matters relating to the new club house, the Board adjourning to meet again Thursday evening, October 27, and asking the Entertainment Committee to meet with it to consider the programme for the opening night. The work on the new club house was reported as progressing satisfactorily, and if all the contractors get through on time agreed, the next club meeting will be held in the new house. Several new members were elected, including Prof. Geo. F. Barker, Dean of the University of Pennsylvania; Major J. M. Brown, of Washington, D. C.; L. C. Weir, of Cincinnati; W. Minor Smith, Bridgeport; W. F. Chester, T. J. McTighe, R. N. Dyer, Frank S. Pickernell. A number of other applications were reported for posting, but under the by-laws could not be acted upon until the next meeting.

There was in attendance about fifty gentlemen, notwithstanding the very inclement weather. From England there were present as guests of members of the club Prof. J. Swinburne, Prof. Geo. Forbes and Messrs. Sellon and Ram; the U. S. navy and army were well represented, the former by Admiral Cronin, Capt. Erben, president of the Board of Navigation, Capt. W. S. Cowles, U. S. S. "Dispatch," Lieut. Toppan; and the latter by Lieut. Zalinski, the inventor of the dynamite gun, and Lieut. Andrews, of the Fifth Artillery; among others present were Mr. C. J. H. Woodbury and R. W. Toppan, Boston; W. E. H. Marsh, Cincinnati; E. L. Smith, Topeka; Dr. Leonard Waldo, Waterbury, Conn.; President H. C. Davis, H. L. Storke, H. A. Reed, W. L. Candee, Chas. N. Judson, W. D. Sargent, T. J. McTighe, H. D. Hall, H. R. Garden, R. W. Pope, W. F. Chester, M. W. Goodyear, Geo. Worthington, A. H. Patterson, Chas. Perrin, John Beesley, Henry Hine, Albert Taylor, C. O. Baker, jr., S. T. Wilcox, Frank C. Mason, Chas. Dutton, Theo. Mace, Chas. Cunningham.

Dr. Leonard Waldo was introduced by Pres. Davis at the conclusion of the dinner, and spoke as follows:

WHAT IS AN ELECTRICIAN?

Several years ago I listened to a singularly suggestive paper before a section of the American Association for the Advancement of Science, which was then holding its session in that city which I have heard described as a way station on the main road between New York and Washington, on the question, What is Electricity? Since then the title has occasionally caught my eye in the desultory reading of this journal and that, and I have been impressed with the amount of speculation which can be indulged in with reference to this peculiar power from which

we expect to gain so much income to ourselves and so much ma'erial benefit to the world of progress whose servants we are. I do not know that I ever had any very clear idea as to what electricity can or might be. Possibly our mathematical physicists are right, and the Aurora Borealis is a magnified Plücker's tube and our electricity is but a modified form of the ether in space by which we receive our impressions of light and heat from the nearest star, and which may be dense enough to retard Encke's comet and may still differ from matter by ways we know not of, and not be susceptible to the law of gravitation. Perhaps we are wise to consign our conception of electricity to that eternal limbo which we call energy. But whatever definitions may occur to us relating to the nature of this new power, it is quite certain that we have it as a tangible reality and that we have certain little trade tricks and a slight knowledge of the ways of guiding, storing, and converting it, which put us off in a little class by ourselves, of the world's artisans; and we should not be unconventional if we decided among ourselves in the odd moments of the next few years to come as to what should constitute a legitimate claim for admission to the brotherhood of electrical engineers.

It is quite the thing for the review writers and the contributors to advisory educational literature to point out the value of the new profession to those young men, happily a large and growing class, who fail to see much attractiveness in the profession of law, or medicine, or letters, or the church. These young men, with their college training and their laboratory courses of physics and chemistry, constitute one class from which the ranks of our new profession are to be recruited. In the service of the telegraph and the telephone, and now the electric light, there is a class whose beginnings have been those of the hand worker, the telegraph dispatcher, the battery man, the line man; and from this class occasionally one rises to a point where he establishes a small office and builds call bells in houses, and maintains district messenger service, and with a small modicum of knowledge of applied electricity and a good knowledge of average human nature, he accumula es money and business acquaintances, and by these influences rise-perhaps to be an investor in the electrical inventions of electrical men. This man, as a type, prides himself upon his practicality. He may or may not end the days of his financial prosperity by a large backing of primary batteries for incandescent electric lighting, in which, though zinc is one of the electrodes of the battery, yet the cost of lighting is almost insignificant because there is no appreciable amount of zinc consumed!

As a profession we have little history and no traditions. Our professional forefathers contributed nothing to the art of war and protected none of our physical forefathers in affairs of church or State, or robbery of landed property, or the entailing of vested rights, secured by the right of the stronger to take whatever he could lay his hands on and hold against all comers. We had nothing to do with the democracy of the Athenian state, or the decadence of the Roman empire, or the inquisition. Our heritage is directly from the men of science and the lovers of truth We are not bound by any professional code which enjoins upon us silence when our professional brother, from ignorance or want of faithful application of known principles, hurts his neighbor or society, as may our dearly beloved, but, as a class, unscientific brother, the physician. We have no laws growing out of the perpetrated and continued usages of society to uphold and maintain, as have our also beloved and distinguished brethren, the lawyers. The only laws which we must strive to know and to learn are those of Nature herself, and these we are to learn neither from history nor the introspection of man, but from the collation and generalization of the facts which the sometimes generous and the sometimes exasperatingly coy goddess chooses to let us glean. I say then, that in thinking of our professional position we are at the start to take the high ground that our profession is the first of the great professions to come, which take their start from physical science, and rest upon the fundamental facts of nature. We are constantly to class ourselves among those who have no opinions to support, no fetich to worship, and to render an absolute obedience to the laws of physical science. It is evident that neither of the two typical classes we have mentioned are complete in themselves. The university man, with his knowledge of physics and chemistry, has his solid groundwork, but he is lacking in that knowledge of machines and the materials of engineering by which alone his scholastic training could be led into the channels of human service. The second type is hopelessly unregenerate; for he has not the methods of thought which Nature inexorably exacts of those who are to be her successful servants.

Being a professional electrician, it seems to me, involves two things: that of being a specialist, and that the specialty shall involve a subordinate and, as it were, appended profession. The applications of electricity, like the applications of steam are so infinite in number, that it is almost a necessary thing that the electrician should immediately acquire a knowledge of some profession in which his electricity is to be the prominent factor. The student of the generation of electricity from dynamo machinery, is of necessity led at once to the most refined problems of mechanical engineering. It is as necessary for him that axle bearings shall be as perfect and that high velocities, with their accompanying high centrifugal forces, shall be as safely guarded against, as it is that the connecting rod of locomotives shall be accurately keyed and fitted, or that the grindstones in large machine shops shall not burst. The student who wishes to apply electricity to the problems of metallurgy must have the knowledge of the assayer and a familiarity with smelting, and he who would devote himself to originating small currents from the chemical reaction of batteries, must have an intimate knowledge of chemistry, both scientific and commercial. The electrician, at the present state of the art, is confronted with an indefinite number of possible applications, as great in number and variety as the applications of force and power are great in number. He must, therefore, at the very outset, choose his lines of work. No matter what they are, he soon discovers the limits of knowledge, and he soon endeavors to reach out into the border-land of applied science, and so rich is the field that his success is sure, for the present at least, to be only limited by his own training and discerning judgment.

The wide dissimilarity of applications of electricity acts to the destruction of a uniform standard of judgment in estimating profes sional distinction. Most of us would be inclined to accord professional status on the basis of useful achievement to mankind, and there are many applications of electricity far-reaching in their usefulness, but simple in their inception and growth, and which of themselves are not intellectual feats of great difficulty. The Morse telegraph might be cited as a case in point. The moment that the action of closing a circuit in a helix became understood, it required no brilliant generalization to close a helix at a distance, and produce the armature click. It does, however, require a genius and a knowledge much greater in extent, to devise trans-Atlantic telegraphy, or to obtain electric energy directly from the consumption of coal.

As a nation, we hold the first place in the progress of practical electricity, for, while the transaction of the learned societies abroad show as a rule a greater number of workers in the physics of electricity, and their papers are of a high order of scientific value, in all the matters which pertain to the practical development of the art it is conceded that we take the first place. I suppose in Germany, this is to be accounted for by the natural frugality of a people trained in habits of extreme economy. In England the short-sighted legislation of Parliament, has had much to do with the decrease of interest in electric lighting. In the United States, our patent system and the great number of thinkers who have devoted themselves to devising the means of making electricity dividend paying, has put us easily first. It would not be, therefore, improper for us to expect that the United States should ultimately become the country from which the largest class of competent electrical engineers is to be derived. It is especially important therefore, that there should be a good fit for that practical life which the electrical engineer must lead so soon as his preliminary training at the university laboratory or technical school is completed.

The university people have in various places recognized the necessity for the training to be given to the future electro-engineers. You will find a special mention made of courses of study leading up to the practical application after graduation of the student. In some cases this education is reasonably complete. One is very much impressed as he wanders through the equipment of the Massachusetts Institute of Technology, at Boston, for instance. And one is, perhaps, still more impressed by the exquisite researches which have occasionally appeared from the laboratory of Johns Hopkins University; but if the would be electrician seeks for a thoroughly useful and symmetrical training in electrical engineering such as is given by the School of Mines to its mining engineers, for instance, I think he will find it at present not available. I know that there are many places where James Clerk Maxwell can be read under the guidance of accomplished mathematical physicists. I know there are other laboratories where candidates for degrees can follow out lines of research and acquire a knowledge of the methods and discipline of scientific research. But I do not know of any school where students can combine the methods of laboratory measurement, with the knowledge of mechanics necessary for the designing of high velocity machine, and the chemistry necessary to the construction of conductors of any given qualities. The technical schools which shall produce electricians of a wide culture must possess the facilities for high theoretical work, and at the same time keep the student to a plane of rigid practicality. He must know the chemistry of the metals, for at some time or another, a fraction of a per cent. of arsenic or phosphorous or carbon, or tungsten, will creep into his beautiful crucibles of molten copper, and the way which was light before will be darkened now by the halved or quartered conductivity of the apparently good wires which come from his roll mills. He must be enough of a physicist to determine the effects upon conductors which different temperatures, and different conditions of climatic moisture are going to produce. He must be enough of a mathematician to comprehend the elegant, but brief methods of logic, which have come into the mathematical notation of the modern molecular physics. And to these attainments must be added that entire training in the elements of machine design which are common to the other technical professions. The main thought of all that I have said is that our profession in its highest development must unite the pure intellectual training of the man of science with a technical knowledge of the engineer, and that in looking with any critical eye upon systems of education leading up to the actual beginning of the practice of our profession, we should insist upon this breadth of training, as a condition of our approval.

Our best men at present would be produced by the union of the facilities of the physical laboratory in the universities, with the practical work of the shop, and it doubtless occurs to you that this is a not disadvantageous arrangement, since no university could pretend to offer the mechanical facilities of great works devoted to electrical manufacturing. The difficulty with the factory is, that it is organized upon the manufacturing, rather than upon the teaching basis; it is accessible only to its attaches. The library and instruments for research alone are not in keeping with the commercial question of manufacturing a certain electrical machine, or specialty. I think so far, as electrical people, that we have been a class of contrivers and inventors, rather than a class of engineers; I think our true position should be such that people will come to ask us whether what we advise to accomplish certain ends, and that our knowledge and training shall be such that we know the advantages and failing cases of all the devices at present manufactured to accomplish any given purpose; that our freedom of judgment is unaffected by a financial interest in the particular manufacturers devices to be used in given cases. We should be more in the position of having to construct bridges and obtaining our estimates for given qualities of steel girders and masonry, and we should be able to critically examine for our clients the supplies which we are to use in our constructive work for them We should have architects' commissions rather than royalties on our own devices. I do not mean to say that we should not patent our occasional bright ideas, receiving for them the income which is our just due. But I think in our mind that there should be a sort of mental reservation made, that such income was rather in the light of profit from the sale of personal property, rather than the impartial practice of our profession. I know I shall be mentally accused of hair-splitting, as long as I stay in this region of discussion, but my own mind is not very clear as to that unwritten code which allows the able thinker to express in the mathematical language of a formula, a physical truth of the highest importance to apply to science which is given freely to the world, allowing him no other return for his intellectual struggle than the respectful estimate of his fellows, but conveying a full financial return to the first of them who translates the idea into brass and copper, and manufactures it under the protection of our patent office. There is a class of mathematical electricians now springing up, however, who purpose to do their own translating, and of this class we have no more notable example than that of Sir William Thompson. He has not only furnished us with the brilliant conceptions of an original mind, but he has put many of them in concrete form, and from the pecuniary results obtained therefrom, he has been able to still further extend the domain of our electrical knowledge.

I do not believe that any present board of university trustees would be at liberty to consider the kind of plant necessary for the training of young men to be accomplished electrical engineers. The school would be an exceedingly costly one; it would be necessary to maintain plants of machinery, all of which would have to be constructed on an experimental basis—I mean that it would be necessary to have the various types of machines built with adjustable parts so that the effects of variations in armatures and magnets could be studied and compared in all types; it would involve the placing of cable tanks for the testing conductors, under such conditions as they are used in practice. The corps of instructors would have to be drawn from the ranks of men who are now occupying responsible and highly paid positions, for the profession is not yet old enough to boast of a leisure and at the same time, highly cultivated class. There must be a faculty of instructors who are alive to the possibilities of the case, who hate shams, and who will hold the young men up to the integrity of scientific methods at work throughout the whole course. Looking upon the young men as they enter our regular engineering schools, and supposing that their early training has been in mathematics, the modern languages, elementary physics and chemistry, I do not see how engineering degrees could be conferred under a minimum period of four years' training, and I think it would be better if the four years training were preceeded by the regular college course. Man does not live by bread alone, neither does a profession, and it is very necessary for us as a body of engineers, that we have among us men of scholarly and literary tastes who can express in good English, and in an attractive way, the possibilities of our profession Rhetoric may be sadly out of place in the discussion of professional points in our engineering gatherings, but it is still a powerful agent in

(*Continued on page 7.*)

OUR ST. LOUIS LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

The electric lighting fraternity, I am sure, will join with the writer in extending sympathy to the family and relations of the late Mr. Phillips, vice-president of the Kansas City Electric Light Co., who, in a moment of depression, committed suicide. Mr. Phillips was of the "salt of the earth" and a more genial, honest and conscientious gentleman never lived. May he rest in peace.

It is the firm opinion of a certain arc light agent in this city, who is a conscientious Democrat, that President Cleveland brought good luck with him. At the time of his arrival the arc light man in question was in a state of "passive bustivity" and on the day of the departure of the distinguished party he sold a 15 light plant, and later on sold a 10 light plant. As a matter of course his politics will not change this season.

Mr. Bradly agent of the Tucker Electrical Manufacturing Co, has concluded to steal away from our midst, leaving for New York on the 13th inst. Simply another case of the company compelling the agent to hold "the historic bag" without any assistance from the head quarters, save in the way of sympathy expressed in a low tone on the company's type writing machine.

Business is looking up, and when the Kansas farmer together with the man that holds a mortgage on his estate drawing 10 per cent. monthly, and who by courtesy is styled a banker, although a pawnbroker's sign over his place of business would suit him better, conclude to pool issues, then the different companies that have sold machinery to them may get enough together to declare a dividend on their agents' efforts in the field.

The American Company through their agent Mr. M. A. Devitt, has placed 15 lights in the Rope Works of Bascun & Co, and 15 lights in the St Charles Car Works of St. Charles, Mo. The St. Charles Car Company have already in operation 60 lamps of the Excelsior system, but bought the American this time for luck. The Excelsior Company are lighting the roadway of the St. Louis Cable line with 50 lamps extending from Locust street to the station over three miles.

The Western Electric Illuminating Company has installed Mr. Cochran Connely, superintendent of the Brush Electric Association plant, their general manager. Mr. Cochran is a gentleman of large experience and will surely make the Western Co's. plant a very successful one.

Mr. Bagnall, formerly connected with the Brush plant in this city and now superintendent of the Brush plant in El Paso, Texas, was sand bagged when returning home from his station in El Paso and is not expected to survive the attempt on his life.

Mr. Shain, of the United States Company, passed through the city last week on a still hunt, but would not say a word about it. So now, as something is sure to drop in a month or less, look out and stand from under.

We St. Louisans are proud of our own and only Heisler who is pushing his system eastward.

There is not much said about the Heisler system, but it is as good as the best from a long-distance stand point, and when thoroughly exploited in the East will stand second to none.

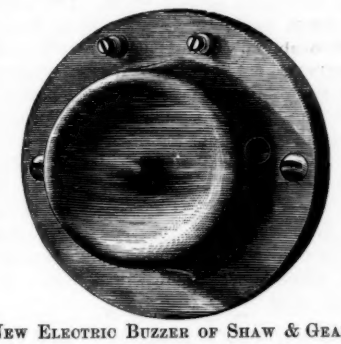
I have no remarkable event to note such as a street car being entangled in a 20,000 volt current and compelling a whole city to go in mourning for the loss of its most eminent people who were killed 40 miles away by the intensity of the current. Nothing of the kind has happened. No houses burned down by grounded wires. No people from the back counties suffocated by turning off the light. On the contrary two men blew out the gas at a hotel in the city last week and the gas companies don't appear to notice it in the least. But had a man been hurt in the least by the electric current; how the different gas light journals would have feasted over it!

ST. LOUIS, Oct. 22.

*** John Callahan and J. T. Green, linemen of the telephone company at Kansas City, met with a severe fall recently, the last named being dangerously injured.

An Electric Buzzer.

The new buzzer from the electrical manufactory of Shaw & Geary, Philadelphia—a view of which is shown on this page—producing a low and musical tone—is to be used in close proximity to the person called, and its signal will not disturb other occupants of the room. It has been a difficult thing to keep a buzzer in adjustment; should a change occur in the battery the buzzer would not operate The claim is made by Messrs. Shaw & Geary that with this buzzer one or more cells can be used without affecting the adjustment. The frame is of polished hard wood, with the adjusting screw on the side, and can be easily fastened in position on desk or wall, without interfering with its sound.



NEW ELECTRIC BUZZER OF SHAW & GEARY, PHILA.

One of the Finest.

Outside, the sunshine, the pure bracing air, the merry songs of birds. Inside, a girl, with eyes wistfully fixed on a tin roof, ear dutifully held at a gloomy black receiver.

"Hello!" (strong and heavy.)
"Hello!" (sweet but languid.)
"Please gimme r-r-r-r."
"Who?"
"Yes, ma'am."
"Who do you want?"
"Ma'am?"
"Who is it you want?"
"I didn't understand you."
"Well, *I* didn't understand *you*."
"Please give me Boyer."
"He has no telephone."
"Yes, he just called me up."
"Well, whose 'phone was he at?"
"Ma'am?"
"Do you know whose telephone he was using?"
"Ma'am?"
"O, wait a minute," cries the girl in desperation.

Experience is a most excellent teacher. She knows where the men go to "dead head" a message. She rings up the last saloon from which she received a call, finds the man Boyer, and so makes the connection. Outside, all Nature rejoices; inside, I'm afraid the daughter of Nature, unlike *Yum Yum* does *not* take after her mother. SPUR.

A New Electro Gong.

The Star electro-mechanical gong recently offered to the public by the Electric Gas-lighting Co. of Boston is so successful an attempt to simplify the complicated apparatus hitherto used, that no further improvements are expected. The release is operated as in other gongs by an electro-magnet. The hammer falls by gravity into position for the blow. An attachment on the release holds the hammer up in place if the release is still attracted by the electro-magnet. It is therefore impossible to give more than one stroke by pressing the key once, as a blow is struck as the current ceases, and the armature of the release falls away from the electro-magnet. The hammer in falling into position for the blow releases a stop-lever and sets in motion the operating mechanism, consisting of a spring geared to a five-pointed star. One point of the star forces the hammer to strike a blow. As the hammer rises it forces the stop-lever back into position to prevent further motion of the star. 250 blows may be struck with one winding of the spring. The gong is of extreme simplicity and contains no springs in any of the working mechanism. The magnets may be wound to any desired resistance for any circuit in combination with other apparatus, and require very little battery power. The construction is strong and substantial, 8, 10 and 12 size of gong are made at present. Larger sizes will be supplied as demanded. This is the only gong that can be used on locomotives without false alarms from jarring.

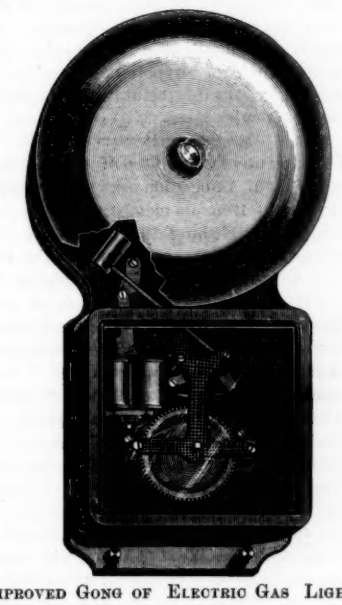
Alternating Current Shocks.

Death is probably preceded by a series of states nearly analogous to what occurs in drowning, when death ultimately results from the inability of the lungs to continue to perform their proper functions, owing to their being filled with water instead of air. The only difference is that in drowning the action of the lungs continues, but is of no effect, whereas under the influence of the current the action of the lungs probably ceases altogether.

As artificial respiration is a most effective means of resuscitating people apparently quite dead from drowning, so analogy would point to its probably being the most effective way of restoring any one in the same condition after receiving a severe shock. It seems to me, further, that the man who had received the severe shock would have this in his favor, that his lungs would still remain in their normal condition, and not be partially choked with water, as they would have been had he been nearly drowned instead.

Turning now from the action of the current on the living body as a whole, it may be worth while considering its action locally on the parts of the body where it enters and leaves.

If the contact is good, that is if it consists of a good area, say of over a couple of square inches of fairly moist skin, pressed with moderate firmness against a metallic



IMPROVED GONG OF ELECTRIC GAS LIGHTING CO., BOSTON.

body or other good conductor, then no visible injury may result. For instance, a man will often get burnt about the hands, but his feet, by which the current leaves, are either unaffected or else only slightly reddened or inflamed. Burning of the hands or other parts of the body will occur when there is imperfect contact, arising either from imperfect contact of the body with the conductor or from the body while in a position to form a good conductor coming in contact with a bad or semi-conductor, such as a dirty or carbonized surface. The burning is caused by the absolute setting up of an arc.

For instance, a man had hold with one hand of an iron bracket fixed in a wall to support a transformer; inadvertently he caught hold of the bare end of a lead, carrying the primary current with the other; he could not release himself, but was pulled away from his position by those standing by. It was found that, though not otherwise injured beyond a considerable shock to the system, his hands were badly burnt.

Standing on a dry floor and touching one of the primary conductors, does not seem to have any other action than that of exciting an unpleasant sensation, though it is not an experiment to be too frequently or incautiously tried.

So much for the danger of alternating currents of high potential; that they are dangerous there is no doubt, but the danger has been exaggerated. Dealing with them is, I am convinced, not more dangerous than many other engineering operations in which hundreds of men daily engage, though owing to our inexperience and the natural fear we have of anything undefinable, they at present may seem so. I see that they are recognizing this in America, and that they are now beginning to manipulate alternating circuits of 1,000 volts tension with considerable confidence.

To show what may be done in this direction, I may be perhaps permitted to mention that during the Jubilee week, in order to join up a new customer to the Grosvenor circuit, I was able by taking proper precaution, personally to take off the insulation from the mains in two places, clean the copper conductors, splice and solder the two branch leads to the mains and afterwards cover the joints with India rubber tape and solution in the orthodox manner, the full tension of 2,500 volts being on the mains all the while.

Owing to its being the first time the operation was performed, one had greater difficulties and disadvantages to contend with than would be the case in doing the same thing again; in fact, I was obliged to and did freely handle the bare conductors with my fingers, which were only protected by leather gloves. I could feel a slight tingling sensation whilst actually in contact with the bare copper, and a slight spark passing to one's fingers was visible. Once, owing to the over-eagerness of a workman, I received a moderate shock, but otherwise suffered no inconvenience, and was able to demonstrate at any rate to my own satisfaction, that jointing with the current on could be done after a few more trials as a matter of business and daily routine.—*London Electrical Review.*

OUR KANSAS CITY LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

The Washington, Kansas, Electric Light, Heating and Power Company has been chartered. The capital stock is $12,000. A. W. Moore is president.

Herbert Hackney, assistant superintendent of machinery of the Atchison, Topeka and Santa Fe line, will go to New York soon to investigate the matter of electric lighting for railway cars.

An electric light plant with both arc and incandescent lights is now in full blast in Kingman, Kas.

Springfield, Mo., has contracted with its electric light company for 40 electric lamps, for $5,828 a year.

The Pacific Mutual Telegraph Company has secured right of way along the Santa Fe and its branches in Kansas, and will immediately begin the construction of its lines.

An electric light plant is to be placed in Lyons, Kas.

The war of the Memphis citizens against the increase in rental of from $60 to $72 a year by the telephone company is assuming serious proportions. An adjourned meeting of citizens was held last Wednesday at the Merchants' Exchange, to hear the report of the committee appointed last week to confer with the manager of the telephone company. The report of the committee was that the telephone managers refused to heed the protest against the increased rent. On motion, the recommendation of the committee that all subscribers give notice to the company to take out their instruments on Thursday was carried without a single dissenting voice. A committee of five was also appointed, to arrange for the formation of a telephone company, which will open up negotiations at once with other parties. Stock to the amount of $100,000 will be subscribed for, to establish the new company. Every business house in the city signed the agreement to order out the telephones. On Thursday, the telephone manager was kept busy receiving notices from subscribers to take out their instruments, but in no instance has the company removed them. Over 1,000 of their subscribers in Memphis have given official notification for the company to take out their telephones. The feeling against the company is becoming more intense, and when the committee appointed complete their plans for the establishment of a new company, the stock will be promptly subscribed. The merchants and citizens of Memphis are determined to stand firm against the demand of the company for increase in rental. This question will be settled by the next legislature, and no man can be elected from this county, who will favor allowing rents for telephones to exceed $4 per month.

KANSAS CITY, Mo., Oct. 15.

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EDITORIAL ANNOUNCEMENT.

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We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. C. C. Haskns, 118 LaSalle Street, Chicago, Ill., will represent the REVIEW in the West.

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NEW YORK, OCTOBER 29, 1887.

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It is evident that the raise in telegraph rates will be gradual—but will get there just the same.

The Board of Electrical Control, New York, is a most remarkable body. "How not to do it" seems to be the motto inscribed on its banners.

Our article on Rotating Transformers in the REVIEW of Oct. 1 has apparently excited much interest among our contemporaries abroad.

We do not think a "temporary" conduit in the streets of New York at all desirable, even from the standpoint of a citizen or from an electrical point of view. Please give us something better, Messrs. Commissioners.

In the list of entertainments to be given by the Y. M. C. A., Orange, N. J., is announced a lecture by Mr Chas. Dutton, entitled, "What is the Telephone?" to be delivered December 7. The lecture is to be illustrated and will no doubt be interesting and instructive.

An interesting illustrated description of the new consolidated exchange of the Metropolitan Telephone Company appeared in the New York *Sun* last Sunday. It was technically and telephonically correct, proving the reliability of the source from which the *Sun* secured its information.

Why not define an "Electrician" as one who understands and can apply the immortal law of Ohm in its simpler arithmetical ramifications of every-day practice, and reserve the title of "electrical engineer" to those gifted mortals who can dive and splash around enjoyably in such depths as the "vector potential of electric currents," the "magnetic potential due to a current-sheet or a spherical bowl," or "hypotheses of molecular vortices," and the delightful little enigmas of electrokinematics?

The Executive Committee of the National Electric Light Association asks for voluntary subscriptions from its members to cover the expense of publishing the records of the meetings, and to properly present the bill asking Congress to create a commission to revise the patent laws and methods of procedure. We hope to see a prompt and liberal response to this request. The association cannot afford to drop the good work it has commenced in relation to the patent office, and its proceedings should, by all means, be published in convenient pamphlet form for benefit of all members. Hereafter the dues will no doubt defray this expense.

The merging of the B. and O. Telegraph Company into the Western Union will result in the discharge of a number of very efficient operators. Probably 150 in New York city alone will be discharged. The general superintendents nearly all, we believe, possess unexpired contracts, and it is supposed that their positions with the Western Union will be in some degree similar to their former one. Such men as Bates, Leslie, Zeublin and Price are always in demand. General Superintendent Selden, of Baltimore, one of the best men on the B and O. staff, will not be affected by the change, we presume, as he occupies the responsible position of superintendent of telegraph for the entire Baltimore and Ohio railway system.

Our esteemed contemporary, the London *Electrician*, seems to be very skeptical about the "alleged extraordinary output" of the Edison rotating transformers, recently, and exclusively, illustrated and described in the REVIEW. We do not see anything extraordinary about it. These transformers being perfectly balanced and having no side thrust from belt strains, *can* be driven at an exceedingly high velocity without damage. The motor generator closely follows the law of independently excited machines, where the electric work is nearly proportional to the square of the speed. Considering then that 3,000 or even 4,000 revolutions per minute is safely attainable, there is no mystery—without reference to the existence of the powerful field. Certainly we have not said that the ratio possible will be attained in every-day practice. In all cases of course the iron core and the low tension conductor of the motor generator will be selected according to the maximum output to be permitted. We hope to soon give our readers the technical details of a plant in operation.

DEATH-KNELL OF THE DYNAMO—PERHAPS.

As we go to press the announcement is made of a discovery by E. G. Acheson, of Pittsburgh, of a new principle in the conversion of energy directly from coal. The apparatus is called a "Cal-Electric Generator." The inventor claims a useful conversion of 40 per cent., of the heat energy as against 15 per cent., the best attainable in modern steam plants. We await the details with interest, for if the above figures can be practically demonstrated the dynamo is doomed.

A NEW ELECTRIC METER.

With the growth of incandescent lighting will inevitably come a demand for a simple and thoroughly reliable meter. The meter elsewhere described seems a move in the right direction. Thousands of possible consumers will not have electric light except on the same basis as gas, *i. e.*, to be paid for only as used; and we think that in the coming adoption of the light for domestic use everywhere, the present system of charging a certain sum per month per lamp, irrespective of the extent of use, will have to give way to the meter system, if a meter can be found which will be strictly honest in its behavior and whose code of morals will respect the rights of all.

WHO WILL LAY THE FIRST STONE?

The suggestions contained in the paper read before the Electric Club by Professor Waldo, which will be found elsewhere in this issue, are well worth weighty consideration. If a man have an idea whose embodiment he thinks might improve the speed and efficiency of locomotives, a class of reliable experts exists who can pronounce on his conception. If a river is to be spanned on high, another class of educated and trained experts are at hand to demonstrate the especial advantages of a cantilever over a suspension bridge for the particular locality. The intending paper maker can readily find the information needed in his bisulphite process and the dimensions of his lead-lined digesters And so on through the long category of the mechanical arts and chemical processes, until, as Prof. Waldo admits, we must draw the line at electricity, because this science is as yet too young for the maturity of a growth of a purely professional class, and a high class educational institution capable of conferring the proper training does not exist, and he therefore suggests an enterprise to be inaugurated by "some of those who have received of this world's goods from electrical enterprises," such an enterprise as would build them monuments more lasting than brass; namely, the establishment of a College of Electricity. The idea is a noble one, and the fulfillment will be difficult, but not a bit more impracticable than was the distribution of incandescent light a decade ago.

Who will lay the first stone?

We think, however, our modest brother from Yale draws the line too sharply, plants too high a goal. The standard he proposes is one to which few men, no matter how gifted, could attain. We do not, in the pregnant years to come, want a few bright minds widely separated and practically inaccessible to the multitude. We have many such now, and they have done and are now doing noble work, but it is true that we have as yet no "leisure class" of that high character.

This is essentially an age of specialism.

A century ago it was quite within the scope of a bright and well-balanced mind to learn all that was known of the laws of nature and their every-day applications to the industrial arts. But we must remember that a hundred years have passed, and the trail is strewn with the graves of immortal toilers who have wrested nature's treasures from her jealous grasp. Electricity to-day stands as a beacon to the industrial world, sending forth in all directions rays of power and vigor, and even hope for the revival of the lost arts. And in the very near future we will find her energy infusing itself into even the least healthy and thriving industry. But what mind could, even to-day, imbibe a thorough technical knowledge of it all? It cannot be. We must go into specialism in electricity, as in all sciences and arts. How many lawyers, celebrated for their profound knowledge of corporation law, have any reputation as pleaders in the criminal courts? How many practicing physicians are familiar with the details of all reported "cases," and an infallible remedy for their recurrence? How many mechanical engineers could direct the repairs of a smashed-up Jacquard loom? Yet all law is but a single science. Physiology is only another. Mechanics is but a generic term involving a multitude of species, all springing from the one source.

The Electrical College, or High School, is a very good idea, but let it rather be as a University of Electricity, teaching nothing but the laws of electricity and its applications in the industrial arts. Let it have selective courses, that a student could map out his line and study only that, if he liked, so that even the bell-hanger, if he could "read and write and cipher," could at least thoroughly master the business of bell-hanging. Let it have degree courses in fulfillment of Professor Waldo's idea, such that the recipients would be at once looked up to as professional electricians, whose opinion is conclusive; but let it also have special degree courses, where the electric light engineer, the telegraph engineer, the telephone engineer, the electro-metallurgic engineer, and others can win a sheepskin, whose possession will be to each of them an "open sesame" to the respectful attention of the industrial world. There is here a great opportunity for the benevolence of some of our wealthy and generous fellow men. Such an institution could be established on a firm basis, and this city is the place for it. Who will lay the first stone?

THOMSON-HOUSTON ELECTRIC RAILWAY AT WOONSOCKET, R. I.

On Wednesday, Oct. 19th, several gentlemen, upon invitation of the local railway company at Woonsocket, were invited to inspect the new line operated by the Thomson-Houston motor. This road is particularly interesting from the fact that it possesses several points of great difficulty, as for example the short curves which the narrow streets necessitate and one long grade, which in places is as much as 7 per cent. The generator used is the familiar type of Thomson-Houston dynamo, 400 volts potential. The line is an overhead one, two parallel conductors of 00 wire, the current being picked up by the ordinary trolley, which is connected to the car by spring clips held in place by friction. The motor which rests upon its side is balanced upon one axle of the car, its armature being connected by rawhide gears. Upon this occasion the car acted in a thoroughly satisfactory manner, and was thoroughly under control of one man, the speed being varied at will, and the direction of the car reversed by the same lever which governed the brake. The Thomson-Houston Company may congratulate themselves upon the successful working of this their first motor applied to traction uses. The company is known as the Woonsocket Street Railway Company.

A telephone on exhibition in Pittsburgh does away with the necessity of speaking. A sensitive plate "presses against the larynx and glands of the neck, and as the jaws are moved in conversation, the motion sends the words along the wire as distinctly as the telephone now in use," says a Pittsburgh contemporary. There are occasional remarks made in front of a telephone that would have an odd sound if whispered.

The American Bell and the Central Union are making things lively in Indiana. A little combination of fifty-one users of the Cushman instrument has been proceeded against. A reporter says there is considerable feeling manifest. Of course! Anyone who has had some infringing instrument sold him under a representation that he is going to be protected, and finds that he is left to hold the bag, when the day of dismay and tribulation arrives, must have feeling. Logansport will in all probability be next on the list, which now includes South Bend, Laporte, Elkhart, and other points. Indiana's condition is not unlike that of the man in the fable, who "bit off his nose to spite his face."

OUR CHICAGO LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

Ludington, Michigan, had an unusual stirring up on the 13th instant. The occasion was the lighting of the city by a plant of something near a hundred arc lights. The programme included speeches, music, fireworks, cannon, marching and steam whistles. Everybody from the neighborhood came into town, and everyone enjoyed the confusion and the lights. The fire department, civic societies, etc., paraded, and all the public halls were arranged for free dancing, and the people enjoyed themselves some more. Ludington is lighted by the Brush system.

Detroit is going into the storage battery business on a somewhat extended scale—and according to the newspaper reports, will manufacture accumulators. The patents will cover all that has been done by Faure, Plante, Swan, Volckmar, Beeman, Shaw, Starr, King, Phillipot, and several other eminent electricians. "Light is to be stored in convenient pockets for delivery anywhere, and power will be contained in small, neat, harmless-looking jars," to run sewing machines, elevators, and it is expected to propel "street-cars, buggies, yachts, and heavy machinery. The battery is composed of a vessel of glass in which are a number of plates of lead and rubber. The vessel is filled with diluted sulphuric acid, and the battery absorbs ninety per cent. of the current!" How is that for high art in an electrical way? It is not improbable that some stock could be purchased, if one were to hurry.

Parties intending to winter in the City of Mexico should investigate the merits of a very complete hotel there which advertises thus:

"Central location, the rooms are elegantly furniture, perfect ventilation, electric bells, telephon, dinning room, parlor, billiards, letters box, interpreters, arsticular desirable for families and tourists. Rates reasonableness."

Buffalo's telephone exchange, which includes Rochester, and nearly all of the western end of the State, has been examined into by the Assembly Smelling Committee. The company has but sixty-two shareholders. From a little one-horse affair in 1879, with a capital stock of $30,000, it has been nurtured and nourished and coddled, until its stock to-day has got up to $600,000, and no one of the sixty-two gentlemen mentioned dare leave a share out of doors if there is the least sign of a frost. The expansive power of water at the moment of conversion into ice is something fearful, you know.

Funny, how a blunder in a telegram will change the sense. An electric light man, rejoiced at having closed a nice, small contract, telegraphed "Keep owes us six thousand five hundred."

Agent says, "Glad of it. Bring the man with you."

Then the reliable old post-office man brought a copy of the first dispatch, somewhat elaborated, which showed how the E. L. M. had secured a contract for a town which is not "Keep," by the way. Message should have read "X—— ours at six thousand, five hundred," and the answer, when the explanation made it clear, said "read mon (and understand money), instead of *man*."

And yet the people, now that the W. U. has gulped down the B. & O., and changed the opposition rate from 15 cents to 50, between Chicago and New York, are advocating a government telegraph, because such a thing works well enough in Europe, where "God made yesterday, and to-day. He will make to-morrow. There is time enough," is the rule and guide of hurry. Where it often takes hours to deliver a message originating within the corporate limits of a city, at the other side of town, and where a message for which extra pay was demanded was from 8 P. M. until the middle of the next forenoon getting across the city to tell a wife, who was alone, that hubby wouldn't be home that night, and of the ten words over one-third were bulled. That's the kind of telegraph to have. Down with the monopoly, and let us have an old-fashioned government telegraph, by all means.

Still, when all is said and done, the patrons of telegraphs have still that

"Sweet little cherub that sits up aloft
To look out for the life of poor Jack."

What's the matter with putting trust in the Postal Telegraph Company? This company has still an existence and it covers a very large extent of territory. The rate from Chicago to New York by the Postal lines is twenty words for twenty-five cents, while the Western Union charges fifty cents for ten words. The telegraph opposition hydra is not killed—it is only scotched.

A telegraph operator's curious freak comes from Ashland, Wis. A son of a St. Paul, Minn., clergyman, and who was once an operator for the W. U. Company in Chicago, went to the Odanah Reservation station, as operator on the Milwaukee, Lake Shore and Western Railway. Young Richter fell in love with a cream-colored half-white daughter of Lo! who had just returned from the Milwaukee Industrial School, where she had resided for the past four years.

Miss Lo! had severely smitten the hearts of several dusky sons of the forest, and a council of Chippewa braves corraled the young brass-pounder, and demanded that he should follow the law of the tribe—marry the girl and go with her to the home of her parents, and help support his mother-in-law.

He married the girl, and is now dodging the forty-syllabled invectives that the Indian brotherhood is hurling at him from every direction.

Two rather peculiar fire alarms in Chicago, recently, are attributable to electricity. In the first instance the lamp was hung stationary from a high ceiling, and the switch was handled by a pole. A miss-blow knocked the wire out of the post just far enough to leave an arc burning. Beyond the scare no damage was done. In the second case a party putting up a furnace piled all the old iron he had against the wire, which ran down the wall. Vibrations, arising from the hammering, cut the insulation, grounded the wire, and started a row. No damage—but in the first case a switch has displaced the pole, and in the second case a better insulated conductor has let out the undertaker's wire.

The bucket shop rumpus is not yet over. Murphy & Co., who were accused of, and believed to be the parties, furnishing the "militia" traders with quotations, were in court with a suit to recover their ticker and quotations.

Judge Collins took the broad ground that if the board furnishes its market quotations to any one it must furnish to all, and cannot discriminate. The decision is very ably written, and strikes a very severe blow at the selfishness and partiality of the Board of Trade.

President Wright, of the Board of Trade, was asked what effect Judge Collins' decision would have with reference to bucket-shops in general being supplied with Board of Trade quotations:

"It won't give any of them the quotations who are not getting them now. As a matter of fact, Murphy has been getting them right along, under the injunction brought by him last July, which was to restrain the Western Union Telegraph Company from removing its ticker from his place, and to restrain the Board of Trade from discriminating as long as it continued sending out quotations. Had Judge Collins' decision sustained the motion to dissolve the injunction, we could forthwith have cut off all the bucket-shops in the West, but as the matter stands nothing can be done in that direction until we get the decision of the Appellate Court in the case of the New York and Chicago Grain and Stock Exchange, which we expect about Nov. 1."

John J. S. Wilson, jr., was married on the 20th instant, at Bloomington, Ill., to Miss Lucy B. White, second daughter of Dr. J. L. White, a well-known and prominent member of the medical profession and of the Masonic fraternity, a Past Grand Commander of the Knights Templar of the State. Mr. Wilson is a Chicago gentleman, bears a name well-known in telegraphy and telephony, and is auditor of the Central Union Company. The young couple will make their future home in Chicago, where the groom has hosts of friends to wish them every happiness and receive them with a hearty welcome.

Electrical business organizations are on the increase. The following have quite recently come to the front:

Illinois Woolley Electric Motor Company of Chicago; capital stock, $100,000; object, manufacture of magnetic electrical engines; incorporators, Clair D. Vallette, Albert N. Eastman and Edward E. Gray.

National Electric Construction Company, of Chicago; capital stock, $100,000; object, to build and operate elec ric plants, etc.; incorporators, T. Edward Tuttle, F. A. Wender, O. G. Fessender.

Brooklyn Electric Motor & Lighting Company, of Chicago; capital stock, $100,000; object, to furnish electrical power, electric light, etc.; incorporators, William A. Stiles, James McLaughlin, John R Hollister

The struggle for the lighting of the Union Depot property on the west side has resulted in a contract awarded to the Thomson-Houston Company, who are wiring the premises for a large plant, including an arc system, and an independent incandescent plant, thus accomplishing both indoor and outside illumination.

At the meeting of the Chicago Electric Club, on the 17th inst., Mr. E. P. Warner, of the Western Electric Company, read a very interesting paper on Automatic Current Regulators. After having quite thoroughly described in a general way the various appliances in that direction from the earliest down to the present time, Mr. Warner was candid and just in his concluding paragraph:

"Having thus briefly mentioned the well-known methods of regulation, in about the order of their appearance, I will say in conclusion that the best systems I have seen in operation fall far short of that accuracy and reliability that it is hoped may be reached by future inventors."

The meeting was held in the new rooms of the club, 122-124 Clark street. The attendance was large, and the evidences are that the club will soon have as cozy club accommodations as any similar organization in the country.

Mr. Warner's paper was discussed by Mr. Sperry, Prof. F. B. Badt and others. A hearty vote of thanks was accorded the reader for his able paper.

The regular meetings of the club being fixed for the first and third Mondays, the next regular meeting will be held on the 7th of November, when Mr. B. E. Sunny, Supt. of the Chicago Telephone Company, will read a paper on the "Inductive Action of Electric Light Currents on Telephone Lines."

Mr. Sunny has offered a reward to the modest owner of a dynamo who will come forward with the facts, where one of these generators has been materially damaged by a telephonic current. He says he always feels a sympathy with the under dog in a fight.

On the 18th, a telephone lineman named Borcher was killed at New Orleans by electric current. He and his partner were running a wire, when it became necessary to "pull over" an electric light route. Borcher threw a rope over the large wires, and his partner pulled while he paid out slack. No sooner had the telephone wire struck the electric light wire than Borcher leaped into the air, and fell back. When reached he was dead.

The system of electric lighting which killed Borcher is one of the alternate current kind, and this is the second fatal result from it within two months.

An electric light wire fell and hit a colored individual, who was severely but not fatally injured, on the same day. Another wire blown down during the storm had a misunderstanding with a mule's legs. The animal and a man who helped to get him loose received severe shocks. The current set one fire in a bar-room, another in a hotel, and a third in a hat store. The fire alarm wires were crossed and tangled up badly, and bells were rung by the electric demon in charge of the festival of the elements. No material damage was done to any of the city electrical apparatus. A few days previously the current got away on the levee, and burned some fifteen bales of cotton.

CHICAGO, Oct. 24th, 1887.

ELECTRIC CLUB NOTES.

A number of "non-resident" members have been callers at the club the past week.

C. O. Baker, jr., is making quite a record in the line of telling new stories—all of them electrical.

A number of club members enjoy their noon lunch together at the Astor House in one of the south parlors.

The Entertainment Committee is just now realizing its responsibility. The coming "opening" is the cause of it.

Secretary Garfield, of the Thomson-Houston Company, was a guest of President Davis at the club rooms this week.

The Board of Managers meets every Thursday evening, and will continue to meet this often until the new house is finished.

There will be one more meeting of the membership committee before the opening. There are several applicants to be passed upon.

The Electric Club will open its new club house on 22d street, about November 24th. Only members of the club will be present on that occasion.

A number of the club members paid their respects to Mr. A. V. Garratt, secretary of the Boston Club, and his bride, who were New York visitors this week.

The secretary complains that he can't frame the photographs of the members of the board because their modesty prevents their sending in the photographs.

It is generally conceded that Lecturer Dutton made one of the great efforts of his life when he undertook to prove to his listeners at the last club meeting that he was an "electrician."

J. G. Kaelber, a non-resident member, has located in Denver, Col., and is rapidly regaining his health. It is quite a distance to travel to attend club meetings, but Mr. Kaelber may be expected during the winter.

The best looking member of the club is said to be the Hon. James English, with Dr. Leonard Waldo, also of Connecticut, a close second. The banner of the ugliest is without opposition carried by Chas. Dutton, electrician.

General Manager Frank Beach, of the Central Union Telephone Company, was a club visitor this week. Col. Beach is the same genial entertaining gentleman as of old, the meretricious attack of the legislatures on his telephone company apparently having had no effect on his cheerful nature. It has not been very long since he was receiving congratulations and wedding presents in New York, and marriage has certainly not been a disappointment to him.

The American Electrical Car Company, of Philadelphia, has been making experimental trips with their new motor upon the street railways of that city, and with such success that it is expected to come into general use there this fall.

The Thomson Electric Welding Company, of Lynn, Mass., are fast getting a factory in shape to turn out the machinery necessary in electro-smithing operations. A very wide field will welcome this new enterprise.

A method of regulating the speed of gas and other engines for driving dynamos has been devised by M. Menges. In this system the supply of gas to the motor is controlled electrically by means of a solenoid coupled up with the lamps, either in series or in parallel, according as a constant potential or a constant current service is required. A soft iron core is placed in the solenoid, and any variation of the current in the latter causes a corresponding change in the position of the core. The core is connected by a lever to the gas valve, the opening through which is thus varied, *pari passu*, with the current through the coil. This is so arranged that the greater the load on the dynamo the wider is the gas valve opened, with the curious result that the speed of the engine is greater under high loads than under low.

⁂ Judge Pratt, of the Supreme Court, decides that the officials of the city of Brooklyn cannot interfere with the work of the Subway Commission. This means that the underground work of the telephone company in that city will at once be resumed, it having been stopped pending this decision.

⁂ Manager Wm. A. Vail, of the Law Telephone Company, of New York, was married to Mrs. Koop, daughter of Robert Brown, of New York, on Saturday October 15th, at Trinity Church. The marriage was private, only the groom's brother, Theo. N. Vail and his wife being present. The REVIEW extends best wishes.

⁂ The Inter-Continental Telephone Company, headquarters in Boston, possesses the valuable territory in Venezuela, S. A., and is of the opinion that there is no territory of any value left for the American Telephone Company, of Washington, to occupy. The Continental uses the Bell instruments. There are about 1,000 subscribers to their exchange in Venezuela.

⁂ President C. F. Annett, of the Rocky Mountain Bell Telephone Co., Salt Lake City, one of the pioneers in telephone work, is visiting in the East. His company operates the territories of Utah, Wyoming, Montana and Idaho, and has about 1,500 subscribers. The number is gradually increasing, the largest exchange being at Salt Lake City, where there are about 450 subscribers Mr. Annett is also at the head of the United Electric Company, which does a general electrical business with headquarters at Salt Lake City.

⁂ Several changes are reported to be made in the Metropolitan Telephone Company's staff, November 1st. Mr. W. A. Vail will take charge of all the exchanges of the company, with title of Superintendent of Exchanges; Mr. Edward A. Eckert, who formerly held this position, takes entire charge of the extensive private line business of the company, and Electrician, John A Seely, who has had this department in charge before, will devote his future time to the regular electrical work of the exchanges, which has grown to most important dimensions, requiring the undivided attention of this very capable electrical worker.

⁂ PHILOSOPHY OF HEAT.—"Well, my little man," said a principal to a sucking philosopher, whose mamma had been teasing the learned professor to test the astonishing abilities of her boy, "What are the properties of heat?" "The chief property of heat is that it expands the bodies, while cold contracts them." "Very good, indeed. Can you give me a familiar example?" "Yes, sir; in summer when it is hot, the day is long, while in winter when it is cold, it becomes very short." The learned man stopped his examination, and was lost in amazement that so familiar an instance should have so long escaped his own observation.

⁂ The Pan-Electric Telephone papers in the suit of J. Harris Rogers *vs.* A. H. Garland, have mysteriously disappeared from the records of the court. Rogers says: "I have no hesitancy in saying that I believe these papers have been stolen intentionally and possibly destroyed by this time. In this connection, it should be remembered that a bill which passed the House of Representatives, authorizing the Government to annul a patent, was stolen from the Senate. The bill was got on up in the interest of the Pan-Electric Company, but when the newspapers began to discuss the matter, it was found convenient to get this bill out of sight. Then Mr. Garland's answer to my bill was not filed with the court, until attention was repeatedly called to its absence. It will be unfortunate for a good many people if Mr. Chandler is not able to produce these papers."

⁂ A sensation in which ladies delight is furnished by a lion-tamer drawing a hypnotized girl into a den of lions. The lions (but the spectators don't know this) are more afraid of the young lady than she would be of them if awake. They associate her with electric shocks, which, when under training for spectacles of this sort, they had had in the mouth. The damsel was separated from the terrible felines with fine wires connected with electric batteries. When they advanced toward her they came to grief, but through what agency they could not see, and retreated howling. A lion which has had a few shocks will for the rest of his life keep at a civil distance from no matter what young lady. Could not something of this sort be arranged to guard the young ladies who complain of "prowlers"?

ELECTRICAL NEWS FROM THE SOUTHWEST.

(From a special correspondent of the ELECTRICAL REVIEW).

Mr. F. P. Fish, of Boston, attorney for the Bell Telephone Co., arrived here last week, Wednesday, and was met by Mr. J. K. Dunbar, Gen'l Supt. of the Erie, and Mr. Frank B. Knight, of the Bell Telephone Co., and after completing final depositions, instituted suit Friday morning against the Southern Telephone Co., J. L. Bay, Jno. W. Davis, Geo. W. Caruth, J. Erb, Frank T. Vaughan, Edward W. Parker, W. B. Worthen, *et al*, of Little Rock, Ark., for infringement of the Bell patents. The complaint is said to be the largest ever submitted before this court, containing over 500 printed pages. The hearing is set down for the 17th of November, and will be before Judge H. D. Caldwell of the United States Court for the Eastern District of Arkansas.

This is undoubtedly the beginning of the end of competition in this State.

I see by the papers the Cumberland Telephone Company has receded from its position and abandoned the effort to raise its prices at Memphis, agreeing to accept the old rates. The company proposed to put 'em up a dollar a month all around, but the merchants and subscribers raised Cain generally, and kicked to such purpose as to cause the company to craw-fish. They ordered all their telephones out, and threatened to organize another company unless their demands were acceded to, *and won*.

It is to be hoped that some of the manufacturers of magnetic bells will make a note of the remarks made at the Telephone convention in reference to platina contacts. A little work of that kind about the hooks and switches of bells would save the poor inspector many a long trip and lots of work.

RUHTRA.

LITTLE ROCK, ARK., Oct. 27.

Sprague Motor Work.

Messrs Chadbourne & Hastings, agents for the Sprague Electric Railway and Motor Company, at 119 South Fourth street Philadelphia, report that their first road at Wilmington, Del., is nearly completed. They closed recently two more contracts, one with the Wilkesbarre and Suburban Street Railway, at Wilkesbarre, Pa., and another at Carbondale, both to be operated by the overhead system. The first one is for two cars and three and one-half miles of track. There will be dynamo capacity sufficient for four cars, as that number will be put on next spring. The equipment will consist of two motors suspended on each car, which gives the maximum amount of traction, and as the car can be operated from either end, necessity of turn-tables is avoided.

The route at Carbondale, Pa., will be in running order Dec. 1st. The route is from Carbondale to Jermyn, and there will be three cars started this fall, and several more next spring.

* * The Woonsocket Electric Railway, Bently-Knight system, is in daily operation.

* * Wilmington, Del., is to have a new electric railway. T. Wm. Harris & Co., New York, having closed a contract for the plant.

The Increase of Telephone Calls in Chicago.

In a recent interview, manager W. D. Allison, of the La Salle street telephone exchange, Chicago, is reported as follows:

"The rush of work has overtaxed our operators. When we first began business in Chicago an operator could take care of from seventy-five to one hundred wires. Now the average is thirty-seven, and still we are unable to do the business. What do we propose to do about it? As a temporary expedient, in order to decrease the number of subscribers per operator, we must take certain subscribers out of old sections and place them in new ones. Here is an illustration: Finding the work too heavy on the sections from 1 to 900, we to-morrow take out from those sections, all numbers ending with 6 and put them on a new switch-board we have just fitted up. By this arrangement we shall, to a certain extent, relieve every operator in those sections. Of course this will involve a change of numbers. For instance, No. 6, the first wire taken out, was the Wabash local. That will hereafter be 1,901. No. 986, which was C M. Fay & Co. (Mayor Roche's firm), is now 1,971. On this new switch-board we have about eighty subscribers. There will be three operators to run it, giving them an average of less than thirty.

"In addition to that," continued the manager, "we are now endeavoring to buy some more switch-boards. If we succeed we shall put eight operators on that at once, and thus relieve the old board to that extent. Last week we had the heaviest work ever known in the Chicago exchange. If you had been here last week we could have shown you the largest switch-board, with twenty-two operators, where all the 220 cords were in use simultaneously, with possibly ten exceptions. Under such circumstances it was utterly impossible to give satisfaction, and you could probably count one hundred and fifty annunciators down at one time, the operators being unable to answer them for want of cords An uninitiated man might ask: 'Why don't you get more cords?' The fact is that no operator can handle more than ten cords and do justice to her work. Ten cords represent twenty subscribers talking, and that is the limit of one operator's effective service. To-day the average of this office is thirty-seven subscribers' wires to the operator. In every other exchange in this country the average is greater, but we have found from experience that more business is done on Chicago telephones than in any other city with the same number of 'phones.

"We are in receipt of a great number of complaints. Concerning them we have nothing to conceal. The simple fact is that our boards are overloaded. While they were not too heavy to handle six, or even three, months ago, the increased work that has been thrown on the wires for the past month or so has made it utterly impossible for the operators to handle it. Subscribers must bear with us a little while, and they will receive the relief they are entitled to. Not later than the 1st of next May we shall occupy our own building, now being erected on the northeast corner of Washington and Franklin streets. In the new building we shall have ample facilities for doing all the work required of us. The outfit of switch-boards and machinery will be entirely new and of the latest improvement. All the machinery in this office as well as that in our office corner of Randolph and State streets will be sold. The two offices will also be consolidated in the new building. Our order for new switch-boards has already been given to the Western Electric Company."

"Of what specific trouble do subscribers complain the most?"

"They complain of parties being busy more than anything else. In those cases we are powerless to give relief until the parties get through talking. In such cases it does no good to bother the operator or to ring the bell, as it creates confusion. Yesterday a subscriber wrote to the general manager complaining of the operator who attended to his wire, stating that she was careless and inattentive to business. The manager to whom the complaint was referred, unknown to the operator, watched her section for one hour. During that time she answered and made connections for 114 parties, which is more than any operator can do and give the work careful and satisfactory attention. We don't tolerate incivility or impudence on the part of any operator, but where a girl is required to answer 114 calls in sixty minutes she must make each individual response very brief. She has no leisure to listen to long stories or hear explanations. Subscribers who have trouble call the manager, for operators have no time to make explanations. We do all we possibly can, with our limited facilities, to perform the service required by our subscribers. We have in this office ten extra operators and there is an extra force at every office in the city. I wish subscribers who have fault to find would come up into this exchange and see how we exert ourselves to perform our duty."

The Boston Electric Motor Car.

In an editorial on electric motors the Boston *Herald* says:

"The trial of running a car by an electric motor by the West End Railway Company is reported to have proved a disappointment, in consequence of the slow rate of speed attained. This must have been due to mechanical defects, for it is well known that in other parts of the world electric railways which draw their supply of power from storage batteries are run with very great success, the cars attaining a reasonably high rate of speed. It is to be hoped that the railway officials will not grow in any way discouraged at the seeming failure of their first experiment. It is clearly undesirable to continue in Boston our present dependence upon horses for our street cars. Either an electric or cable road must be substituted, for more speed is demanded than can be obtained from the system now in use. The use of electricity by means of storage batteries is the easiest substitution, for it involves no new construction either above or below the tracks. Still, if the desired result cannot be obtained from storage batteries, then the company will be compelled, by force of public opinion, to adopt some other new form of motive power."

* * St Louis is taking great interest in the electric railway question. A number of street roads are considering whether to adopt electric motors on their lines, or wait for further use.

* * The new electric motor car built by the People's Passenger Railway Company for the Electric Car Company of America left the former company's shop last week for the works of the car company, at Twenty-third street and Washington avenue, Philadelphia, to be fitted with the storage cells and motors. The car is sixty feet long and is mounted on two double trucks, and weighs without cells and motors five tons, and with them eight tons. The cells are placed under the seats on rollers, and are run in from the rear of the car through small doors. There will be sixty small storage batteries under each side, and a motor on each truck which can develop from one to twenty two horse power. The motors used are of the Reckenzaun make, and are very powerful.

* * It is not often that a doctor takes the pains to cross the ocean and teach other doctors just for the love of his profession. Dr. Oscar Jennings, who is electrical physician to the Clinic of St Anne, in Paris, where he lives at No. 35 Rue Morbeuf, sailed from New York recently with the satisfaction of having given Gotham physicians a clear idea of his new theory and practice of curing the morphine habit. And it is a mild statement of the facts to say that Dr. Jennings' ideas have created a professional sensation. With the public he has not come in contact at all, but it was easy to see, says the *Daily World*, as he sat in the Hoffman Café a day or two since, dining with a friend, that he would be a man of sympathetic delicacy in dealing with suffering humanity. Dr. Jennings is the Paris correspondent of the *Lancet*.

"What is an Electrician?"

(*Continued from page 2.*)

influencing city councils and village selectmen, and we have much darkness to dispel, many ways to make clear.

I think therefore, that we need in the United States and at an early day, our college of electricians. I think its establishment on a proper financial and professional basis with its board of visitors, made up alike of men of pure science, and of commercial activity would furnish us in the training which its young men receive, at once some standard of professional attainment to which we might refer our ideas when asking ourselves that unsatisfactory question, What is an electrician? In choosing the location for a professional school, the atmosphere of the place should be considered, and I know of no better environment for such a school than that which exists in the city of New York. I think the phenomenal success of the School of Mines, from a professional standpoint, has been largely owing to its location, and to the consequent constant contact which the young men here have with the life of material progress. It remains perhaps for some of those who have received of this world's goods, from electrical enterprises, to organize such a college. It is against the spirit of our national life that such an enterprise should be undertaken by our government, although some of our best electrical engineers have emanated from the needs of our military and naval service.

But, besides our High School of electrical science, there are also needed many technical schools which shall concern themselves with a purely mechanical science of electrical manufacturing. Mechanics of good ability who know the technical meanings of resistances, and insulations, and ohms, and amperes, and who can wind magnets and keep their hands off high potential terminals; men who are trained as carpenters and brass workers are trained, and who have the trade, rather than the profession of electrical construction. Industrial schools devoted to technical electrical work, schools with rows of lathes, and whose sessions are held by night as well as by day, so that the boys whose day work is in the shop, can avail themselves of such instruction and training at night. I was quite interested in the title and subject matter of Mr. Fleming's book: "Short Lectures to Electrical Artisans," and I could not but think what a tremendous stride our army of line men, and electric light men, and telegraph operators would take, if about as much knowledge as this little book outlines, were conveyed to them by that only efficient way of teaching: the experimental method in industrial schools. It might be feasible to establish such schools in the neighborhood of some of our great manufacturing establishments, and I leave the suggestion with their managements for their leisurely consideration. The pulse of their work people could be felt by the feeling of a course of experimental lectures.

Our brethren, the civil engineers, have indeed woven the web of promise, and their shuttles shoot upon the iron rails across the continent and back again. We have furnished them the message which precedes and makes the passage safe; it is for us now to furnish the power for weaving the web, to chain the force of the incoming tide, to harness the flood of Niagara, to make its energy potential, and thus to furnish the power for the industries of a people, by taking it from that belt in perpetual and eternal motion, which pours over its mighty precipice on its way to the earth beneath, and the waters under the earth, and thence back again to the heavens above. (Applause.)

Discussion.

The President: I am not sure that Prof. Waldo's paper, while very interesting, has not left us in the position in which Stockton leaves us in the story of "The Lady and the Tiger." I am in hopes that in the discussion which will follow the paper we shall be able to draw him out further. The paper is now open for discussion.

Several members, among them Lieut. Zalinski called for Mr. Woodbury.

Mr. Woodbury: Mr. Chairman, I see the dynamite gun pointed this way (laughter), and it is therefore necessary to surrender. Now definitions are proverbially dangerous; but in the matter of a definition of an electrician before this assembly, it seems to me to be necessary to reverse the saying, so often uttered in apology, that the present company are excepted, and that the only acceptable definition would be one in which the present company are included. The science of electricity is so broad in its theory, scarcely known, and in its practice, of which much is in expectation, that it is beyond the intellect, or the life, or the power of any one person to grasp the whole of it, and is it not reasonable and just that any person occupied in any of the varied applications of electricity should be entitled to the appellation "Electrician," and in qualifying that title it would perhaps be well to stop at merely the constructive or mechanical portions of the work, which is certainly the handmaid and attendant and inseparable adjunct to any application or use of electricity. But the question must inevitably be an open one, much like that of the dictionary published in the last generation, whose peculiarity was that it contained no definitions whatsoever, but with each word were a number of extracts from literature giving quotations in which the word in question was used, so that in reading those varied quotations one could obtain the spirit and sense in which the word was to be used. The step from what is an electrician to what is electricity may seem a very short one, and yet the latter has never been answered yet.

Mr. Dutton: While I have been interested in the lecture and have listened attentively to the last gentleman who was wrestling with the subject, I find myself puzzled. I had an idea that an electrician was a man that could take any ordinary pickle jar and put into it a spoonful of sal-ammoniac and a little piece of zinc and a piece of carbon and attach a wire to it and call it a battery. He was an electrician. I came to that conclusion from the fact that in the telephone business, which I know more about than anything else—and that is very little—we have had enter into the employment of the company a great many men—those that knew a great deal and those that knew nothing (mostly the latter), and as soon as they were discharged from driving express wagons and could not get anything to do applied for work with the telephone company, because they would work for a very small salary. (Laughter.) In the last three or four years of my connection with the company they have filled, I believe, one wing of the Patent Office with inventions, none of which have been adopted. (Laughter.) But I really used to think they were electricians, because the gold sign over the door said so and I am somewhat disappointed. I thought our company had conferred a great favor on the world in letting loose those electricians, but I assure you I am really grieved to think that they never have seen a college or gone through all this course of study. Most of them couldn't read! And I go away feeling that I for one don't as yet understand what an electrician is. I had thought that I was one myself. (Laughter.)

Mr. Storke: I am engaged in the material side of this business, and am more a student of the laws of trade in reference to it than the laws of nature. At the same time we have to acknowledge our indebtedness to all students who spend their lives in the laboratory, and are engaged in searching out the deep things of electricity. I was very glad to hear the lecturer's views on the subject of royalties—disclaiming any idea on the part of the inventor of exacting from the users any special royalty, but giving the services of the inventor freely for the good of the community, and for the good of those who are engaged in exploiting the inventions. Standing between the inventor and the public we find to be rather a difficult position. It is exceedingly difficult to satisfy the user of a telephone that a ten dollar rate is better than a five dollar rate, or to satisfy the user of an electric light that 50 cents per night is better than 30 cents or 25 cents.

W. L. Candee was called for, and, after stating that he belonged to the practical and not scientific side of the question, asked Lieut. Zalinski to speak from the latter standpoint:

Lieut. Zalinski: I wish Mr. Woodbury would refer to the work done at the Institute of Technology as regards the equipment of the school. Nothing was said as regards the capabilities of that school for doing the very work that Prof. Waldo mentioned; not alone the simple study of electricity from the physical point of view, but also from the mechanical point of view. At the present time the school is equipped, and equipped fully, for the proper instruction of electrical engineers. I have had the assistance of men who graduated from that school as electrical engineers, and I have found them not alone competent as electricians, but also as mechanical engineers, and I would like Mr. Woodbury to mention the character of the work that is done there, because I think it would fill the requirements as laid down by Professor Waldo. I have often received very valuable aid in my experiments from Mr. Candee.

Mr. Woodbury: I am really not able to present to you at this time, merely from memory, any detailed information in regard to the electrical course at the Institute of Technology, as my connection there, if it could be called a connection, is merely that of a lecturer in the department of electrical engineering, requiring me to speak to the boys once or twice a term upon a certain phase of the subject of electrical illumination, and some of the other applications of electricity. But as far as possible they have endeavored to select apparatus which shall be typical, broadly, of the applications of electrical science; that the dynamos shall be provided with coils which can be separated electrically one from another, so that they may operate under various conditions of winding, both in regard to the armatures and the field magnets; that the students themselves shall have, besides instruction in the matter of electrical engineering, good instruction in drawing, in practical shop work with the use of tools, and in other matters that pertain to instruction in mechanical engineering—although it does not, of course, include the full course in mechanical engineering, but as much of it as is feasible in addition to the electrical work there. There is one corporation which is doing a great and good service in the matter of electrical instruction, and that is the Thomson-Houston Company, who, realizing the lack of proper persons to attend to the introduction and installation of their systems in their rapidly growing business, have formed in their establishment what they call the expert course, which consists in giving their young men such shop work as will, as rapidly as possible, familiarize them with the construction and principles of their apparatus. I am sorry that I am not able to respond in detail to Lieut. Zalinski's question.

The President: We have with us this evening distinguished electricians from the land that Professor Waldo says is hampered by Acts of Parliament. It is with pleasure that I now introduce Professor Forbes, of London. (Applause.)

Prof. Forbes: I listened with very great interest to Professor Waldo's address, and I agreed with him in a good number of points. Now I think in the first place it would be very desirable to distinguish between several different kinds of electrical workers, and settle in your mind which of the different classes is going to be called the electrician. For my part, I am inclined to think that the bell-hanger class will be entitled to the name, under a certain qualification which I will mention presently. The first class of electricians that one naturally comes to is probably, in all our estimations, the highest; that is, the scientific man—the man who is able to deal with a new problem in a thoroughly mathematical way, and with the assistance of his experimental work is able to predict results, and to know what is likely to come from a certain course of operations. The scientific electrician, however, is always classed, I think, under a different terminology. He is always a physicist. I do not know of a single case of a man who is only a scientific electrician, and who is not also good at the other branch of the business, and I think we may leave him out for the present. I think we may leave the purely scientific electrician out of the question. He is a physicist. We must reserve the term "electrician" for the one who needs it. Now I think even Prof. Waldo made a little confusion between the different kinds of electricians. It seems to me that there are three classes of them to which he alluded, and to each of which he seemed inclined to give a title. First, there is the working electrician, the man who executes electrical work; secondly, there is the electrical engineer; and thirdly, there is the electrical inventor. The course of training that each one requires is very different, and the qualification for the title is also very different. The electrical engineer must take the place that the civil engineer does in the construction of works. He must be thoroughly versed in all the different lines in which electricity is applied. He must have a thorough training and knowledge in the art and application of electricity. He must be capable of judging of the fitness of a design to effect its purpose. He must be capable of judging whether a certain system of working is more effective than another one. He must be competent to look after these points, whether they relate to electric lighting, electric telegraphy or telephony. In fact, the electrical engineer, like the civil engineer, must have a vast range of knowledge at his finger-ends, and have been accustomed habitually to apply that knowledge in a practical way. At present, I do not believe there is a single school which can bring out a thoroughly trained electrical engineer; I know of none. Take the departments of electric lighting and motive power. I know of no school in any country where the proper methods of designing dynamos is taught thoroughly and effectively. It is, of course, a very difficult problem indeed, from a new type of dynamo, to accurately predict what work it will give, and that is simply an example of what the electrical engineer must be able to perform, and so he must be habituated to the practical applications and have the knowledge enabling him to study these practical applications in other branches of electrical science. The electrical workman, the man who lays down the plant, etc., requires a totally different education from the electrical engineer. In our railway work we have our contractors' and companies' engineers who superintend the work that is going on. These men, I should think, would take the place of the electricians, and would be called electricians in the electrical branch of engineering. They require great experience, but they do not require the same knowledge that the electrical engineer does. At the beginning of the time when railways were introduced it was impossible to carry out a railway without having a great deal of theoretical knowledge; because the art of constructing railways was not at that time reduced to a condition of formulæ and tables, which it has eventually reached. At the present moment electrical engineering is much in the same condition as railway engineering was in those early days. We have not the complete formulæ and tables and short cuts to results which the railway engineers now possess. At the present moment the knowledge required by a railway engineer is not nearly so great as it was thirty or forty years ago, and so at the present time the electrical engineer requires a great deal of general knowledge which the working electrician need not possess. I think that there ought to be this distinction drawn between the electrical engineer and the electrician, and if that distincton is drawn I should say that a very wide scope might be given to the title of electrician. I think that all men habitually and thoroughly conversant with their own department in electric work have the right to be called electricians. It may be desirable to subdivide them into electric light electricians, electro-metallurgists, electro-telegraphists and telephonists, &c., and even bell-wire hangers and various other titles might be given. But I really think that the term electrician might very well be given to each, and let us reserve the title of electrical engineer to the higher and more educated

class, who really require a very sound knowledge of electricity in all its branches before they can put it to the practical applications upon which they are consulted. (Applause.)

PROF. J. SWINBURNE, of London, was called out, and said: Prof. Waldo seems to infer that a man who has inven'ed something should not patent it, but give it to the public, practically the argument being that the scientific man publishes equations, laws, etc., and gets no benefit. But I look at it in this way, that the whole of a scientific man's career depends on his equations, etc. If he could patent them he would do so. I think if Laplace could have patented his equation he would have done so, and I wish he had, because if he had it never would have come into books and bothered other people. I think the question of electrical engineering should be treated in the same way as the ordinary profession of engineering. Electrical engineers are practically a branch of mechanical engineers. In mechanical engineering no one would think of depending on university degrees or university training. The chief reason why university men do not seem to get on in practical work is that they are taught, perhaps, the mathematical theory of things and a little in the experimental laboratory, but they do not learn what is the most important thing to know, and that is the prices of things, and I think the commercial concern that employed one of Prof. Waldo's graduates would be ruined in a fortnight. From one speaker I gather that there is in America a lack of trained men to cope with the enormous development of electric lighting. Now in England we have any number of trained men, but we have no electric lighting for them to do. I think it would be a good thing if we could start a sort of emigration society and send over here about a dozen a week, which is about the rate at which they are turned out in England.

MR. SELLON, of England: Prof Forbes, I think, hit the nail more fairly on the head than any other speaker to-night. He draws a very distinct line between the electrical engineer and the electrician. The electrical engineer is a very much higher order of creation than the electrician, no doubt. For every one such man that will be required in the future there will probably be many scores of men who will be simply required to take charge of a plant. I have been around this country for the last month in company with my friend Mr. Swinburne, and we have noted here that the beings who pass for electricians are, if possible, even a little more slipshod than our electricians on the other side. We, for example, on the other side, would not propose, as at present advised, as they say—for we have no large electric lighting stations by which we can actually make a test—we would not propose to put such lighting stations into the charge of an artisan, but we have noticed that in this country many of the important lighting stations are solely and entirely in the charge of artisans who really have absolutely no knowledge whatever of the theoretical side of electricity, nor have they any inventive faculties in the least. My view of the case is that in the future there will be two distinct classes of those interested in electric work. There will be the electrical engineer who will be required to pass a certain standard test in the same way that a civil engineer does now. But I think we may look forward to the term electrician being applied to a vast horde of individuals who have anything whatsoever to do with electricity; that is to say, from the man who can convert a pickle jar and zinc and carbon into a battery right away, up to the man who has charge of a large lighting station.

PROF. WALDO: Mr. President and gentlemen, I hardly can let some of the things that have come up in the discussion pass without comment and explanation—further darkening the subject. I rise to make a little issue on certain points of education and the relations of purely scientific men to their inventions; and I want to say first that in my cursory examination of matters of this kind in England, I observed that there are certain lines of work in which men constitute their own titles, and I think that that is true of engineering. I think that when a man in England calls himself an engineer, his own interpretation of the word is accepted without dispute. And in the second place, I want to point out that the men of our own technical schools are snapped up, as quickly as they can be produced, by our own people. Our system of education in that respect is essentially different from the education which exists in England, in the one thing that our universities are very malleable and they are not governed by tradition in the sense in which they are abroad. Now I know it to be a case that some years ago a class of sixty young men were going to graduate from one of our scientific schools. Three months before the time of the graduation an application came to the head of that school for three or four young men to go West on an engineering expedition, and on inquiry it was found that every single one of those men had pledged his services in advance. Take the question of civil engineering here, which is a very parallel case to electrical engineering. That degree cannot be had from the universities without a great deal of very hard work. Send a man to the School of Mines or Yale and see what it takes to get a degree there. Send him to Harvard or to the Technology and you will find more than double the training required for the degree of civil engineer than for the degree of doctor of medicine. It is simply impossible to obtain in the United States any of these degrees for anything like the amount of work for which can be obtained degrees in law, medicine or theology. That is essentially an American principle, and the young men who come out of these schools are worth everything to the manufacturers, and the manufacturers appreciate it and pay for it. So much for our education in that respect.

Now in the next place, I did not mean that the inventor was not worthy of his hire, but I do mean to reiterate the principle and the statement, which is known to be true to every one of us, that there is an order of scientific men that is absolutely above hire. It would be simply impossible for Sir Isaac Newton or Laplace to patent the results of their thought. They had the pleasure and comfort of an intellectual advance in the solution of great problems, and they took that satisfaction; and it simply lowers our standard of the worship of the human intellect to say that any man of that order would serve the human race in that way for a pecuniary consideration. (Applause.) It is to the shame of modern civilization that men like Laplace or Newton or Galileo—men of that order of intellect, whether they belong to the time of Aristotle or our own time—are not recognized by the community as the greatest single benefactors the community have. The real benefactors of civilization are the men who discover the laws which determine whether or not there will be a famine in India fifty years hence, and who bring to light the principles of economic science. We do not recognize those men, but we will recognize them as we grow higher. We will see that the highest form of benevolence which the world has is that of men who devote their lives to the advancement of sound learning.

In regard to an electrical engineer patenting his own invention, the idea which I have tried to make clear is this—that the electrical engineer ought to be free from every taint of securing profits from his own inventions in a given electrical field. (Applause.) If a man approaches an electrical engineer, he should approach him as he does a lawyer of undoubted integrity and high standing in the community, knowing that his own particular property interests are not going to influence his judgment, any more than a judge on the bench would be so influenced. It is that class of men which I do not wish to debar from holding their inventions. Let them have all the money which can come from their inventions. But when they are called upon to act in their capacity of high engineering power, then let them have that *esprit de corps* which shall enable them to use their knowledge and their position without reference to what they may have patented or what interest they may own in this stock company or that. Now we have no electrical engineers as a class in the United States. Every one of our brilliant men—Mr. Edison, or Mr. Bell, or Mr Brush, or Mr. Thomson—those men have been immediately surrounded by capitalists, and their great engineering talents have been absorbed by stock companies, who claim their services for the development of particular ideas. We cannot therefore have that class of engineering talent. It can only be reached by the development of such a class as we have, and I think, in the suggestions I made, that idea is pretty clearly defined—that we are to have the electrical engineer at the top, and that we are to have the electrician, who shall be educated as Mr. Forbes has said, in the exceedingly interesting remarks that he made. I think that when we apply the term electrical engineer, or the term electrician, there should be some definite meaning attached to those terms, and I think that the easiest and most acceptable way to determine this standard is to encourage the granting of degrees by our universities and our schools of science, in electrical engineering, just as we have in our civil engineering, in our mining engineering and in the cognate professions. (Applause.)

MR. DUTTON: I move that the thanks of the club be tendered to the lecturer of the evening for the very able paper he has given us.

The motion was carried and the meeting adjourned.

*** The trial of the Brush-Julien electric motor car, St. Louis, is reported quite successful.

*** Washington's Belt Line Railway Company has decided to adopt the electric motor system in use in Philadelphia, using the Electrical Accumulator Co.'s storage batteries.

*** The Edison Phonograph Company has been incorporated at Jersey City with a capital of $1,200,000. A factory has been established at Bloomfield, N. J., in charge of Lieut. F. W. Toppan. Mr. E. T. Gilliland will have entire charge of the business of the Phonograph Company.

*** George Addy, the Paterson, N. J., party who cut down a telephone pole of the N. Y. and N. J. Telephone Company in that city last July, was indicted by the grand jury last week on two counts. Mr. Addy will have an opportunity to explain his erratic action in the Circuit Court of Passaic county, before Judge Hopper.

*** William William Smith, who recently launched a weird and uncanny telephone story out upon an innocent and unsuspecting public, now announces that he has discovered a loud-speaking telephone down in Kansas that will make the paper peel off the walls, which he proposes to investigate and report for the REVIEW's exclusive benefit.

*** The Washington *Post* publishes extracts from the text of the concessions granted by the Chinese authorities to Count Mitkiewicz and the Barker Brothers and their associates for telephone and banking privileges in China, and states positively that the grants have been signed by all the proper Chinese officials, and that the imperial seal has been attached to both of the grants. It asserts that English greed and business competition are at the bottom of the assaults made upon the American grantees.

*** The sixth annual convention of the American Street Railway Association was held at the Continental Hotel in Philadelphia last week. The association was organized in Boston on Dec. 13, 1882, with 32 companies. The members now represent more than one-half the value of the street railways in America, including Canada. The capital stock of the companies of the association will exceed $125,000,000, while it employs fully 50,000 hands. Representatives were present from nearly every large city in the country. William Wharton, Jr., read a lengthy paper on "Electricity as a Motive Power," and Mr. Richards, of Boston, followed with a speech favoring electricity as applicable to street cars.

Cornell's Electrical Engineering Department.

The equipment at Cornell has been almost wholly contributed by friends of the University, at the suggestion of the Director of Sibley College and others interested in its progress. The last and most important addition to the collection, that of the Westinghouse 650-light alternating current dynamo, exciter lamps and other material required in establishing the plant, has already been mentioned. The list of dynamos now includes the Edison, the Gramme, the Mather, the Westinghouse alternating current, the Westinghouse continuous, a number of Weston and minor makes, and all sizes, from a little toy machine made in Cornell's own shops to the 50 or 60 horse power machines just added to the list.

There comes with this liberality on the part of friends of the University an embarrassment of real importance: there is no immediately available room for the installation of these machines. The dynamo room, now appropriated to the purpose, is hardly large enough for the "cradle" used in conducting experiments on a single machine. The Weston machine is tucked in one corner and the Edison and Mather machines are temporarily placed in the middle of the floor and driven as best can be done from there. There is actually no room even to lay down the new machines now en route from Pittsburgh, still less to place them for use. In this emergency the director has obtained permission from the trustees to make temporary provision for them by throwing the existing toilet rooms into the machine shop, thus securing a space some 15 or 18 feet by nearly 40, in which to place all these machines. It has long been considered advisable on the score of safety and convenience to remove all heavy machinery from the main building, and this transfer of the dynamo room will give opportunity to effect other improvements there in time. Professor Morris is already arranging new toilet rooms and getting ready to tear down the brick partitions which have been found to be in the way of the new arrangement. Professors Van Vleck and Smith are preparing plans for the belting and countershafting, in consultation with Professor Nichols, and the work is to be proceeded with at once. The space now given up to this machinery must, however, in time be required for the extension of the machine shop, and it is only a question of time when a building must be constructed for this course and its collections. Nearly forty students now enter the course annually, and it is only second to the regular course in mechanical engineering in importance in the Sibley College organization. The expenditure of all that may be needed to make its material part complete, aided as it is so effectively by its friends outside the University, will be more than justified.

Professor Thurston estimates that about $100,000 should be expended in its permanent establishment: $60,000 on building, including $15,000 on water and steam power each of which should give 150 horse power, the one for use in ordinary work, the other whenever experimental work compels the utmost possible regularity of speed; and the balance in supplying needed additions to the equipment of apparatus of exact measurement for heavy currents, and $40,000 to furnish the income needed for running expenses, including fuel, one workman and an assistant to the Professor of Physics, who should be placed in charge of this valuable property; which, although a part of the Sibley College establishment, is really managed by the department of physics in all except its power supply. It is not impossible that, as Mr. Cornell used to say, "there is some one walking around who wants to provide this' now greatly needed laboratory. It is certainly an opportunity for some wealthy and public-spirited friend of the University to do a noble work for his fellows.

—— Little Rock, Ark., is negotiating for electric lights in the streets. Mayor Whipple will be glad to hear from electric light manufacturers.

Detroit Storage Battery Company.

The Electrical Accumulator and Lighting Company, of Detroit, Mich., has been organized, with the following officers: James McMillan, president; Wm. A. Jackson, vice-president; W. K. Anderson, treasurer; Wm. C. McMillan, secretary; Geo. E. Fisher, general manager. The company has a cash capital of $100 000, and has experienced and well-known business men at its head. Already a number of plants are being placed in private residences and stores in Detroit, among the first being the large store of Metcalf Bros. & Co. The Faure storage battery (Electrical Accumulator Co., N. Y.,) is the one used.

The Soda Engine.

Referring to repeated recent statements that "soda" locomotives had been adopted for use in the streets of Minneapolis, Minn., *Wood and Iron* says: During last winter and early spring some experiments were made with a so-called soda engine, and the "soda engine" did make a few trips, with a steam engine in attendance to help it out of difficulties. These "soda" engines were abandoned several months ago, after an expenditure of more than $50,000 in a vain attempt to make them successful. We do not believe that the failure was due to the use of soda, but to poor management, bad designs and worse workmanship.

The Baxter Motor.

The Baxter Electric Motor and Manufacturing Company has been compelled by the increase of business to look for additional factory room, and has just purchased a site on which the company will at once erect a building where 700 employes can work. The building will be 300 by 75 feet, two stories high The capital stock has been increased from $200,000 to $500,000.

The company has decided to open a New York office which will be in charge of Mr. T. McCoubray, the well-known former secretary of the National Electric Light Association. There is a great field here for electric motors, and Mr. McCoubray will find it ripe.

Electric Light in Balloons.

The somewhat curious and novel spectacle of a balloon illuminated by electric light was seen in Edinburgh recently By many people in various parts of the city an unusual light was observed in motion above the Castle-hill, which excited their wonder and curiosity. The explanation of the matter was that an experiment was being made with the captive balloon above the observatory. Half-a-dozen incandescendent lamps of twenty-candle power, each protected by a wire cage, were placed in the interior of the balloon, and were connected with the dynamo in the building below by means of two insulated wires. A very good light was the result, though the effect was rather spoiled by a mist which hung over the city at the time. Experiments were also made in signaling by the Morse system, the utility of which in a certain degree was satisfactorily demonstrated.

—— The following data of the 1882 and 1887 types of Edison machines made in England, are instructive as illustrating the great advance made in the short period of five years:

	1882.	1887.
Number of lamps fed.....	1,100	1,100
Total weight of dynamo.....	44 8.0 lbs.	11.760 lbs.
Weight of armature.....	9.800	1,568
Cubic feet occupied.....	320	180
E.M.F external.....	108	105
Current at load amperes.....	790	720
H. P. absorbed	154.8	112
Per cent. returned.....	73%	90%

—— Messrs. Knapp & Hague, of this city, have been appointed New York agents for the Campbell Electrical Supply Company, of Boston. They are a live firm, and the interests of the Campbell line wire will receive special attention.

—— The Lynn Electric Machine Works are running nights to supply the demand for their motors.

Gas Companies Adopting the Electric Light.

The various gas companies of the United States are considering very carefully the question of combining electric lighting with their gas plant. Many of the companies have already accepted the situation and have now become earnest advocates of a combination. The following gas companies, we are informed, have adopted the American system of electric lighting:

Brookline Gas Co., Brookline, Mass.....	150 lights.
Citizens' Gas Co., Jacksonville, Fla.....	100 "
St. Paul Gas Light Co., St. Paul, Minn....	500 "
Citizens' Gas Co., Jackson, Tenn.....	50 "
New Albany Gas Co., New Albany, Ind...	50 "
Citizens' Gas Co., Orange, N. J.....	50 "
Columbus Gas Co., Columbus, Ind.....	50 "
Glens Falls Gas Co., Glens Falls, N. Y....	100 "
Halifax Gas Co., Halifax, N. S.....	100 "
Meriden Gas Co., Meriden, Conn.....	150 "
Oswego Gas Co., Oswego, N Y.....	35 "
Paris Gas Co., Paris, Texas.....	35 "
Portsmouth Gas Co., Portsmouth, Va.....	100 "
Saratoga Gas and Electric Light Co., Saratoga, N. Y.....	175 "
Schenectady Gas Co., Schenectady, N. Y..	35 "
Seattle Gas Co., Seattle, Washington Ty..	100 "
Tacoma Gas Co., Tacoma, Washington Ty.	50 "

The majority of the above companies find the electric light working so satisfactorily and so much more profitable in connection with gas than at first anticipated, they are now contemplating increasing their arc light apparatus.

The Electric Light Association Records.

The National Electric Light Association, 11 South street, Baltimore, October 20th, 1887, issues the following circular letter:

The Secretary of the Association reports to the Executive Committee that the stenographic report of the proceedings and the papers read at the Convention held in Detroit, Philadelphia and Boston, and which constitute most valuable chapters in the history of the application of electricity to the demands of modern civilization, are still unprinted. The lowest bid that has been received from the printers is about $1,000 for 1,000 copies of about 800 pages.

The treasurer reports that the funds in his hands are entirely insufficient to meet this expense.

The Committee on Patent Legislation reported to the convention held in Boston, August 9th, a bill (of which a copy is enclosed) to be presented to Congress, providing for a revision of the patent laws of the United States, and particularly for certain changes and reforms in the Patent Office, the necessity for which has forced itself upon the members of the association. The bill provides for the creation by Congress of a commission to revise the present patent law, and correct the existing defects. To insure the passage of this bill, much labor will devolve upon the committee, as well as some expense for clerical work, printing, postage, etc. About $1,500 will be needed properly to present the bill before Congress.

The passage of this bill is the most important work that has been undertaken by the association since its organization, and the committee feel confident in calling upon the members of the association for their assistance. The committee have thought it better to raise the funds necessary for these expenses (about $2,500) by the voluntary subscription of the members, rather than by an assessment, but they feel that so great is the importance of preserving the records of the association, and so vital to the interests of all those engaged in electric lighting, is reform in the patent laws, that ample funds can be raised in this way.

They ask that you will fill up the enclosed blank with such an amount as you are willing to subscribe, and return it to the treasurer. The money is needed at once, so that prompt action upon this matter is especially requested.

By order of the Executive Committee,
S. A. DUNCAN, Chairman.

——The Peru Electric Light and Water Supply Company, Peru, Ill, has been incorporated. Capital stock, $8,000. W. K. Hoagland and others, incorporators.

—— Red Bank, N. J., wants to grant a franchise to some electric light company to light its streets. Don't all speak at once!

—— The Thomson-Houston Electric Light Co., of Raleigh, N. C., are increasing their plant, and have just ordered a 12x12 engine from the Ball Engine Company, of Erie, Pa.

—— A. L Reinmann, superintendent of the lamp department of the Westinghouse Electric Company, Pittsburgh, Pa., was a New York visitor last week, and an attendant on Prof. Waldo's lecture at the Electric Club.

—— The storage battery used with the presidential special train was furnished by the Electrical Accumulator Co., of New York, the work of installing the plant being done by the Electro-Dynamic Company, of Philadelphia.

—— The Paterson Electric Light Company is about to purchase new property and enlarge its plant, the applications for lights being now more numerous than can be supplied. Mr. John F. Noonan is the energetic head of the company.

—— The Messrs. Seevers, of Oskaloosa, Iowa, are building a brick two-story machine shop, to be occupied by the Hawkeye Electric Mfg. Company, of that city. The shop will be 40x120 feet. The latter company are engaged in placing a new electric motor on the market.

—— The Western Electric Company has recently received an order for a 60 arc light outfit for the Scranton Illuminating Co., of Scranton, Pa. Also have orders for a 40-light dynamo for Kankakee, Ill., and one for East Liverpool, Ohio, increasing the plants already running in those cities.

—— The United States Electric Lighting Company, of New York, is putting over 1,800 electric lights into the post-office building in Philadelphia. The cost will be between $60,000 and $70,000. It is expected that the work will be completed by January 1, and it is probable that on New Year's there will be a grand public illumination.

——The Cleveland Motor Company, Mr. C. L. Wright, manager, have purchased the entire plant of the Cleveland Motor Co., of Cleveland, Ohio, and will continue the business of manufacturing electric motors as heretofore carried on by them. The main office will be at 406 Broadway, New York, and their factory at Jersey City, N. J.

—— The agency of the Brush-Swan system of incandescent lighting at Salt Lake City has been transferred from Maj. Erb to General Manager C. F. Annett, of the Telephone Company, personally. Mr. Annett put in the Cullen Hotel plant himself, has had the system working satisfactorily for a long time at Green River and Provo, and expects to put in several extensive plants in the city within a year.

—— The Union Railroad Company, Troy, N. Y., has contracted with the Edison Electric Light Company to light and heat the Union depot. The railroad company will furnish the ground, and the Edison Electric Light Company will erect a building 60x75 feet, just east of the depot, on Fulton street. Two boilers will be put in, and an engine and electrical apparatus of sufficient power to generate light for the entire building. The cost of the plant is estimated at about $30,000.

—— It is interesting to learn that in the recent French exhibition experiments the electric light industry was called upon to furnish its contingent. The work was carried out by MM. Sautter, Lemonnier & Co., who had to supply, at very short notice, the necessary materials to light the principal points of embarking and disembarking the cavalry—two at Toulouse and one at Carcassonne. At each station there was a dynamo, giving 16 amperes current at 600 volts, feeding a new arc lamp of 150 carcels. The dynamo was mounted upon the same truck as a portable engine, which was used to drive it, so that the whole of the apparatus could be easily removed.

ELECTRIC LIGHT NEWS

—— Bay City, Mich, is receiving proposals for lighting the streets with gas and electric lights

—— At Corpus Christi, Tex, an electric light company will be soon organized to light the streets.

—— At Antigo, Wis., a company has been formed with $10,000 capital, to erect electric street lights.

—— Fredonia, Kansas, will have electric lights, using the Thomson-Houston electric light system

——C. B. Bellinner and Joseph Paquet are interested in an electric light plant to be established at Albina, Oregon.

—— It is anticipated that within twelve months, every important theater in Europe will be lighted with electricity.

—— Orange, N. J., has granted a franchise to the Edison Illuminating Company to erect a plant for street lighting.

—— The Peninsula Electric Light Company, of Houghton, Mich., is increasing its plant, and have ordered a 10x12 Ball engine.

—— The Waterhouse Electric Company, of Baltimore, has been incorporated. Robert R. Zell and Wm. R. Pope are at the head of the company.

—— The plant of the Thomson-Houston Electric Lighting Company, at Houlton, Me., has been purchased by citizens, to be transferred to the water company.

—— A Jenney electric light plant is being put up at Florence, Ala. The Anniston City Land Company, same State, desires to establish an electric light plant.

—— The Coates Clipper Company have put a 50 light Tremont electric light plant, which can easily be increased to 60 lights, and which gives excellent satisfaction.

—— A permit to erect an electric light and power plant in Columbus, Ga., has been applied for by Messrs. T. E. Blanchard, Amory Dexter, and E. H Jenkins.

—— The city of San Antonio, Texas, will have the Brush system of electric lighting, and have just ordered their steam plant complete from the Ball Engine Company, of Erie, Pa.

—— Spokane Falls, Wyo., wants proposals for erecting an electric light plant (1,800 incandescent and some are lights). Immediate attention is necessary if you want the contract.

—— The Edison Electric Light Company, of Amsterdam, N. Y., are increasing their station, and have ordered a 12x12 Ball engine, this making the fourth they have in their station.

—— The Thomson-Houston Electric Light Company of Philadelphia has been awarded the contract for the establishment of a plant at the Queen's Run Fire Brick Company's Works at William-port, Pa.

—— At Rochester, Minn., the city has granted a franchise to the Electric Light Company, and work on plant will be begun at once. Charles Streeter, superintendent of water-works, is interested in the work.

—— The stockholders of the Schuyler Electric Company met last week in Middletown, Conn, and elected as directors: John N. Camp, Henry Woodward, O. V. Coffin and Seth H. Butler, of Middletown; C. N. Wayland, New York; C. E. Dustin, of Hartford, and Frederick Fosdick, of Fitchburg, Mass.

—— The city council of Edwardsville, Ill., has contracted with E. W. Mudge, of that city, to light the streets with .000 candle power electric lights, the franchise to continue five years. Fourteen lights were located by the council, to be furnished at an annual rental of $108 each, and all additional lights to be supplied at $100 each.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING OCT. 18, 1887.

371 536 Brush shifter for dynamo electric machines and motors; Edward H. Amet, Chicago, Ills. assignor to himself and Herbert A. Streeter, same place.

371.555 Anti-induction device; James Curran, Portland, Oregon.

371,557 Means for preventing induction on electrical conductors; Stephen C. Drew, Boston, Mass., assig or to the American Telephone Improvement Company, of Maine.

371,559 Electric meter; Richard N. Dyer, East Orange, N. J.

371,570 Locket and key for incandescent lamps; John J. Fisher, Allegheny, assignor to the Westinghouse Electric Company, Pittsburgh, Pa.

371,583 Electrical registering device; Arthur S. Hotby, Cincinnati, Ohio.

371,626 Device for indicating life in buried persons; Carl Redl, Vienna, Austria-Hungary.

371,640 Electric alarm and recorder for oil presses; Erwin W. Thompson, Charlotte, N. C. assignor to the Southern Cotton-Oil Company, Camden, N. J.

371,655 Electro-magnetic brake apparatus; Granville T. Woods, Cincinnati, Ohio, assignor to the Woods Electric Company, same place

371,664 Electric forceps; John Brannan and William E. Stone, Denver, Col.

371,671 Art of splicing cables; John Collins, San Francisco, Cal., assignor of one-half to S. V. Mooney, same place.

371,681 Conductor for electric wires; John Grant, Omaha, Neb.

371,696 Electric alarm clock; Simeon P. Meads, Oakland, Cal.

371,720 Electrical indicator; Montgomery Waddell, New York, N. Y.

371 752 Electrical or signal apparatus; George W Foster, Galveston, Texas.

371,755 Vibrating rheostame; John R. Hard, New York, N. Y.

371 757 Telephone holder; Augustus L. Hott, Cincinnati, Ohio.

371,808 Joint for lead covered cables; Richard S. Waring, Pittsburgh, Pa.

371,840 Electric circuit connection; Samuel Heffner and John H Phillips, Pottsville, Pa.

371,869 Coin-operated electrical weighing scale; Edwin R. Whitney, Manchester, N. H., assignor to the Standard Electric Company of Vermont, St. Johnsbury, Vt.

371 876 Fire alarm telegraph; Charles Burgher, Boston, Mass., assignor to the Automatic Fire Alarm and Extinguisher Company (Limited), New York, N. Y.

371,893 Electrical distribution and charge of secondary batteries; Frank King, Fulham, County of Middlesex, England.

PATENTS.

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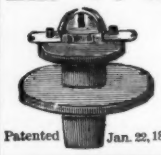

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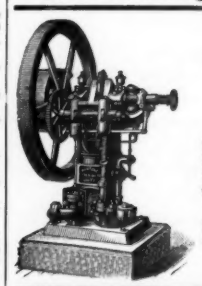

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